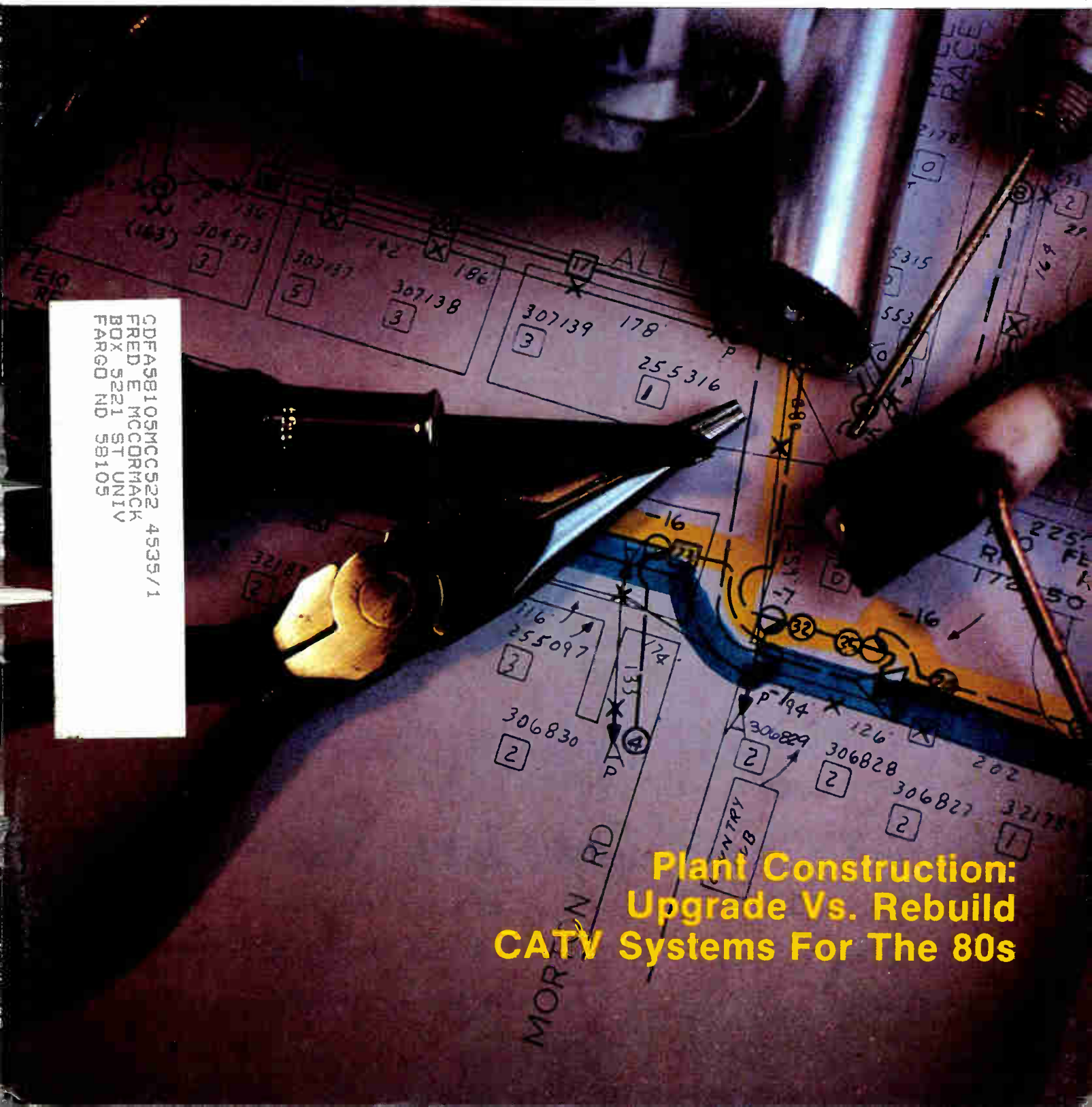
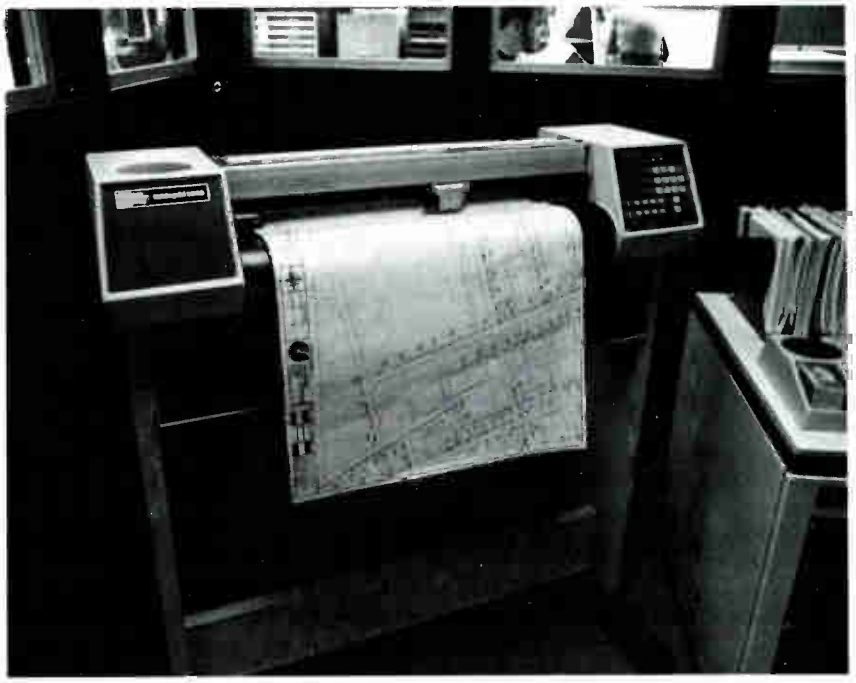
CED™

Product Profile: Coaxial Feeder Cable

Communications Engineering Digest/The Magazine of Broadband Technology March 1982



Plant Construction: Upgrade Vs. Rebuild CATV Systems For The 80s



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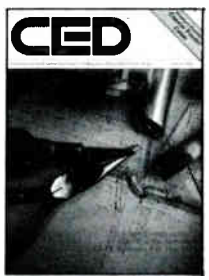
Contents



About the Cover:

This month **CED** focuses on the problems and issues of system rebuilding and/or upgrading. The consensus among engineers indicates that problem solving could originate in the initial planning and design stages. Photo courtesy of Jackson Enterprises.

CED (USPS 300-510) is published monthly by Titsch Publishing, Inc., P.O. Box Box 5400-TA, Denver, Colorado 80217 ©March 1982, Volume 8, Number 3. Subscription Price 1 year, $24.00; 2 years, $40.00; 3 years, $58.00. Canada and Mexico add $6.00, and other foreign subscribers add $12.00 per year. Second class postage paid at Denver, CO. **CED** is published on behalf of all parties, including the Society of Cable Television Engineers (SCTE). POSTMASTER Please send form 3579 to P.O. Box 5400-TA, Denver, Colorado 80217. BPA membership applied for May 1981

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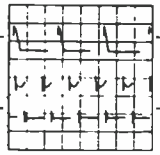

Get On The Beam

Sir Isaac Newton notwithstanding, gravity is not constant at all points above the earth. Take Satcom III-R's position on the geosynchronous orbit for instance. Since the spacecraft is over the Pacific where gravity is less of a force than over the land mass of the Americas, RCA Americom engineers must maneuver the bird back West into position every three weeks. Actually, according to Archie Miller, manager of spacecraft operations for RCA Americom, the window for reception of Satcom III-R is considerably tighter than originally accepted by the Federal Communications Commission. RCA Americom holds Satcom III-R to a window that is ±.08° East-West and ±.07° North-South. For best reception, system operators must align antennas as close to the center of that window as possible, especially for ESA's located at the outer edges of the footprint. Otherwise, if it is picked up at its Northeast corner or, later, at its Southwest corner, the signal may be off the main beam with unnecessary noise caused by side lobes or the alternate polarization. Therefore, correct alignment is crucial and particular care must be taken to make the adjustments at days and times specified by the spacecraft operators. To help with alignment of ESA's, RCA Americom has a tape-recorded message available 24 hours a day with the latest data on the positions of all their satellites. Call (201) 827-8444 or, if further information is required, call RCA Americom engineers at (201) 827-9400.

Thanks, But No Thanks

Last summer, Congress passed the Omnibus Reconciliation Act of 1981. Among other things, the legislation instructed the FCC to use lotteries as a substitute for the comparative hearing process utilized to award a telecommunications license or construction permit to mutually exclusive applicants. However, in February, the FCC effectively told Congress that it didn't care for the plan. Two reasons were given for rejecting the lottery as proposed by Congress: first, it required that the commission evaluate the qualifications of applicants before the lottery was held. In the view of the FCC commissioners, this would be just as time-consuming and costly as the comparative hearings they were trying to avoid. Secondly, Congress said preference must be given to minorities, women and "other parties underrepresented in telecommunications." The Commissioners balked at this requirement as well. Commissioner Mimi Dawson told *CED* that she was all in favor of lotteries, but they had to be "without preference." Chairman Mark Fowler also said he supported the concept of a lottery, but that there would be "protracted administrative and judicial proceedings" if the lottery mandated by Congress were to be implemented. Congressional reaction was swift and wrathful. Timothy Wirth (D-CO), chairman of the House Telecommunications Subcommittee, said he was "outraged" by the decision. "I am committed to seeing that the commission obeys the law and rectifies (this) action immediately," Wirth said.

For Sale

No doubt about it, the way of the future is transponder sales. At a recent FCC meeting, the commission began the proceeding that would allow satellite companies to sell transponders outright to their clients, the so-called "condominium approach." The reason for this is a growing realization that the company that builds, launches and operates a communications satellite is not getting equitably compensated for the risks it is taking. The commission intends to move toward demand-based rates for satellite transponders, but it also said that a good, old-fashioned auction is not the way to go about it. During the same meeting, the commission rejected the auction held last November by RCA Americom for seven slots on its Satcom IV bird. The legal reason was the discrepancy between the low bid of $10.7 million and the high bid of $14.4 million. According to the Communications Act of 1934 "equal prices must be charged for equal services." This was enough to throw out RCA's auction, but the company still has a satellite in orbit and no way to fill it with more than the eight clients who will be moved over from Comstar D-2. RCA would like to sell the transponders, but its timing is a little off. The proceedings will be completed later this year.

Packing The Tents

CBS has taken its high definition television show on the road the last month or so. In conjunction with NHK, the Japanese broadcasting company, CBS has been giving demonstrations of HDTV in Los Angeles, New York and Washington, D.C. The road show is an obvious attempt to drum up support for the technology, which has been losing a round or two of debate in Congressional hearings. Since the bandwidth required for HDTV (20 to 25 MHz is a conservative estimate) is so large, conventional satellites are not equipped to transmit it. Therefore, the only spectrum presently available is in the 12 GHz band. There is considerable doubt as to whether HDTV can be transmitted in this range terrestrially, so the next natural place for it would be aboard direct broadcast satellites. But some proponents of PBS are calling HDTV a waste of spectrum. Stanley Hubbard, president of Hubbard Broadcasting, has called CBS' proposal for using DBS "nonsense and baloney." On the other side, Joseph Flaherty, vice president of CBS, has said that the 12 GHz band is the last chance for HDTV. If that window is missed, Flaherty said, the United States will go into the 21st Century with the poorest quality television reception in the world. Whether CBS will be successful is still anyone's guess, but demonstrating the HDTV transmissions, which utilize 1,125 scanning lines instead of the standard 525, is the best lobbying technique CBS could use.

Hughes Fills Slots On Galaxy I

Hughes Communications filled its last full-time slots on Galaxy I recently, taking on the Spanish International Network (SIN). Earlier, SIN charged Hughes with backing off on a $14 million deal for two transponders in favor of a third-party agreement. As part of the agreement, SIN will drop its Federal Communications Commission petition filed in December, and will not reveal the transponder price. Commenting on the change of heart, SIN Executive President Andrew Goldman said, "Hughes came back and said, 'Let's talk. Come on out here and we'll negotiate the deal.' End of story." Hughes did so, but after the third-party talks broke down, according to one company official. "Let's just say the situation between us and SIN was an interlude," the source continued. "We wouldn't have negotiated with them if the relationship was severely strained." Like four of its five fellow holders of Galaxy I space—Time Inc., Westinghouse, Turner Broadcasting and Viacom, SIN declined to reveal transponder plans. (The fifth, Times Mirror, has publicly suggested its two Galaxy slots would carry Spotlight.) The satellite is scheduled to launch in May 1983, with 18 of the 24 slots accounted for.

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TOCOM

Seminars

March

3-5: The annual convention of the **Arkansas Cable Television Association** will be held at the Arlington Hotel in Hot Springs. Contact the association, (501) 661-7676.

7-9: The annual convention of the **Ohio Cable Television Association** will be held at the Hyatt Regency in Columbus. Contact the OCTA, (614) 461-4014.

8: This is the deadline for nominations in **NCTA**'s National Awards competition to recognize excellence within facets of the cable television industry. Contact Teresa Schwab, (202) 775-3622.

8-10: A technical conference sponsored by the **Society of Cable Television Engineers** will be held at the Copley Plaza Hotel in Boston. Contact Robert Huckabee, (202) 293-7841.

8-12: A **Community Antenna Television Association** advanced technical training seminar will be held in New Orleans. Contact the CATA Engineering Office, (305) 562-7847.

9-10: A two day seminar on the French developed "Smart" microcircuit card sponsored by **Intelmatique** will be held at the Mountain Shadows Resort, Scottsdale, Arizona. For more information, contact Jean Young or Dee Bennett, John Adams Associates, 1825 K Street, NW, Suite 210, Washington, D.C. 20006, (202) 466-8320.

10-12: Magnavox CATV Systems will be conducting a field training seminar in its Mobile Training Center at the Ramada Inn, Arlington, Texas. Contact Larry Richards, (315) 682-9105.

11-12: The annual convention of the **Louisiana Association of Cable TV Operators** will be held at the Regency Motor Hotel in Shreveport. Contact Andrew Angelette, (504) 446-8444.

15-17: Magnavox CATV Systems will be conducting a field training seminar in its Mobile Training Center at the Ramada Inn, Arlington, Texas. Contact Larry Richards, (315) 682-9105.

16: The 1982 Communications Techniques seminar, sponsored by the **Princeton University** Department of Electrical Engineering and the New York, Princeton and Jersey Coast Sections of **IEEE**, will be held at Princeton University. Contact Stuart Schwartz, (609) 452-4618.

16-17: A **Blonder-Tongue** MATV/CATV Technical Seminar will be held at the Pacifica Hotel, Culver City, California, in conjunction with **Ellard E. Strassner Co**. Contact Chuck Fitzer (415) 449-0547 or Ellard Strassner (408) 988-7762.

16-18: A product training seminar presented by **Scientific-Atlanta** will be held in Kansas City, Missouri. Contact Joan Smith, (404) 925-5509.

16-18: Information Gatekeepers Inc., is sponsoring COMSEC '82, the international communications security conference and exposition, at Boston's Hyatt Regency Cambridge. Contact Michael O'Bryant, (617) 739-2022.

17-18: The annual convention of the **South Carolina Cable Television Association** will be held at the Carolina Inn, Columbia. Contact Robert Scott, (803) 785-5175.

18-19: The annual convention of the **Georgia Cable Television Association** will be held at the Sheraton-Atlanta Hotel. Contact Wes Owens, (404) 687-6109.

18-20: Magnavox CATV Systems will be conducting a field training seminar in its Mobile Training Center at the Ramada Inn, Arlington, Texas. Contact Larry Richards, (315) 682-9105.

28-30: The Virginia Cable Television Association's 1982 annual convention will be held at the Sheraton Beach Inn and Pavilion Convention Center in Virginia Beach. Contact Dick Carlton or Lorraine Whitmore, (804) 358-7060.

28-31: The **California and Arizona Cable Television Associations** will hold a legislative conference at the Four Seasons in Washington, D.C. Contact Ed Burakowski, (202) 775-3622.

29-31: The 1982 Information Utilities conference, sponsored by **Online, Inc.**, will be held at the Rye Town Hilton Hotel and Conference Center in Port Chester, New York. Contact Jean-Paul Emard or Jeff Pemberton, (203) 227-8466.

April

2-3: The **International Association of Satellite Users** second annual SATCOM conference will be held at the Hyatt Regency Hotel in Dallas. Contact Dr. Matt Wilson, (301) 299-7875.

4-7: The 60th annual convention of the **National Association of Broadcasters** will be held at the Dallas Convention Center, Dallas, Texas. Contact the NAB. (202) 293-3500.

5-7: A **Community Antenna Television Association** basic technical training seminar will be held in Oklahoma City. Contact the CATA Engineering Office, (305) 562-7847.

5-7: The **North Central Cable Television Association**'s annual convention will be held at the Amway Grand Plaza Hotel in Grand Rapids, Michigan. Contact Jack Doren, (616) 947-1030.

5-7: A seminar presented by **Steinberg and Associates** on "Cooling Techniques for Electronic Equipment" will be held at the Travelodge Tower Hotel in San Diego, California. For more information call (213) 889-3636 or 887-3513.

8-10: The **Michigan Cable Television Association** annual winter meeting will be held at the Grand Plaza Hotel in Grand Rapids. Contact Sandra Applegate, (313) 235-6112.

8-19: BMM National Schools is conducting a two week C.A.T.V. technical seminar at the Van Nuys, California, facility. For reservations call: (213) 994-2288.

12-25: BMM National Schools is conducting a two week C.A.T.V. technical seminar at the Dallas, Texas, facility. For reservations call: (213) 994-2288.

14-16: Magnavox CATV Systems will be conducting a field training seminar in its Mobile Training Center at the Hilton Hotel in Englewood, Colo. Contact Larry Richards, (315) 682-9105.

19-24: Two back-to-back, three-day field training seminars sponsored by **Magnavox CATV Systems** will be conducted in its Mobile Training Center at the Hilton Hotel in Englewood, Colo. Contact Larry Richards, (315) 682-9105.

29-May 1: The 1982 **Electronic Distribution Show and Conference** will be held at the Hilton Hotel in New Orleans. Contact the Electronic Industry Show Corporation, (312) 648-1140.

May

2-5: The **National Cable Television Association**'s 31st annual convention will be held at Las Vegas Convention Center, Las Vegas, Nevada. Contact Dan Dobson, (202) 775-3550.

3-7: A **Community Antenna Television Association** advanced technical training seminar will be held in Albany, New York. Contact the CATA Engineering Office, (305) 562-7847.

12-14: Magnavox CATV Systems will be conducting a field training seminar in its Mobile Training Center in Detroit. Contact Kay Hinkle, (315) 682-9105.

17-19: Magnavox CATV Systems will be holding a field training seminar in its Mobile Training Center in Detroit. Contact Kay Hinkle, (315) 682-9105.

20-22: A field training seminar sponsored by **Magnavox CATV Systems** will be conducted in its Mobile Training Center in Detroit. Contact Kay Hinkle, (315) 682-9105.

TRIM-1 SIGNAL LEVEL METER

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The TRIM-1 Signal Level Meter is an essential part of every TV technician's tool kit, providing a quick GO/NO GO reading on incoming cable signals and avoiding hours of wasted time every week. Designed to clip right onto the technician's tool belt, TRIM-1 weighs only 6 ounces, yet it gets the job done faster and better than conventional testing equipment. And at much less cost! TRIM-1 features include: micro switch tuneable between high and low bands; adjustable internal potentiometer to calibrate specific channel ranges; cumulative carrier testing using standard "F" fitting attachment; 9 volt battery power.

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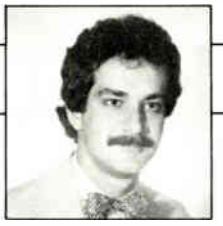
Editorial



Defining High Definition Television

CBS Television Network and NHK (the Japan Broadcasting Corporation) engineering elite have been barnstorming around the country presenting a new round of demonstrations of High Definition Television (HD-TV). Beginning in January in Los Angeles, and moving to New York and Washington in February, NHK has presented what amounts to no less than a glimpse of the future of television picture quality. But before we can actually expect to see HD-TV in this country, a phased introduction of the new technology must take place.

The introduction of HD-TV will involve radical changes in the equipment inventory of the video industry. Virtually all the present studio production equipment, from cameras to video tape recorders and from switches to monitors will have to be those developed for HD-TV. In fact about the only existing studio equipment that would be useable is the editing equipment. HD-TV will require that greater care be taken in the quality of the visual material presented to the studio camera as well, given the high degree of detail that the viewer will have presented on the screen.

Just what is High Definition Television and what does it mean for CATV? At the most basic level, HD-TV is a dramatic increase in clarity and resolution of the picture on the television set. For the past 40 years, American television has conformed to the NTSC standard of 525 scanning lines and an aspect ratio of 4 to 3. With HD-TV, the number of scanning lines is increased to 1,125 per frame and an aspect ratio of 5 to 3. The number of lines in any system determines the resolution of the reproduced picture and the aspect ratio determines the width versus the height of the picture.

At first viewing, the most apparent difference between today's TV picture quality and HD-TV is that the viewer sees greater detail and depth. Indeed, five times more visual information is conveyed to the eyes. The perception of depth is dramatically enhanced by the increase of detail. With the currently employed 525 lines, the degree to which the viewer perceives depth is more a function of an intellectually processed enhancement of an essentially flat picture. While HD-TV is not 3-D, the accuracy of detail renders the depth of quality motion picture film. In fact, it's somewhat better. There are no apparent lines or pixels and there is no blur.

But HD-TV means much more than increased scanning lines and wider screens. It means a new standard for the entire television industry comparable to the introduction of the NTSC color standards in 1953. Not only will picture format and scanning line standards have to be established, but signal and transmission standards, as well. Equipment standards for cameras, film-to-video conversion equipment, video tape recorders, and direct viewing or projection type display devices will also have to be developed, in addition to frequency and wide bandwidth requirements.

Much of all this implies that certain known technologies will be in place or will be ready to be simultaneously introduced along with HD-TV. Digitalized television signal transmission, lasers and optical fiber cable, broadcast satellite service on the 12 GHz band and band compression technology that will help deal with the 30 MHz bandwidth required for HD-TV must all be brought up to speed. In terms of channel scarcity and obsolescence of coaxial plant, cable operators have seen nothing yet.

But if cable operators fail to understand the meaning of HD-TV, there are other industries ready to take up the slack.

On a more "here-and-now" level, we wanted to point out that with this issue of **CED**, we are introducing a new department in the magazine—the Tech-to-Tech section. In this section **CED** will present ideas, helpful solutions, and suggestions that have been submitted by engineers and technicians in the field for the practical edification of other technicians. We hope that technicians will send along their ideas and as an incentive **CED** will offer $25 for every idea published. More than one or two may be published each month depending on the space available. Submissions need not be in a polished form but the basic concept must clearly be expressed so its value is apparent.

George Dell

CED

Volume 8, No. 3

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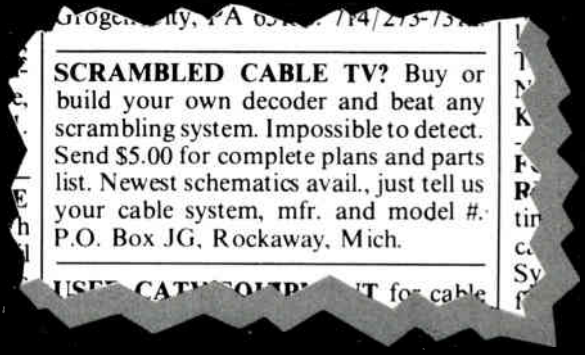
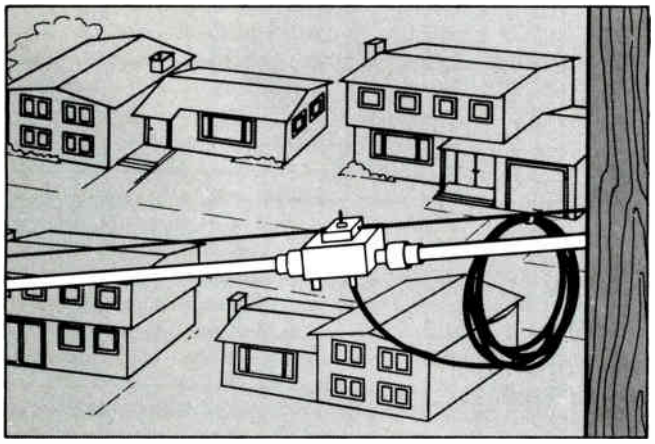
HOW TO STEAL THE SHOW.



SCRAMBLED CABLE TV? Buy or build your own decoder and beat any scrambling system. Impossible to detect. Send $5.00 for complete plans and parts list. Newest schematics avail., just tell us your cable system, mfr. and model #. P.O. Box JG, Rockaway, Mich.

HOW TO STOP IT.



Vitek multi-channel traps provide more security for your premium channels.

No matter how sophisticated a scrambled Pay-TV security system is, as long as the service goes into a home, it's vulnerable. For once it's inside the home, subscribers can clip wires, un-do security screws, buy "black boxes" and come up with ways you haven't even dreamed of to take your Pay-TV service for a ride.

Industrywide, theft of service translates into an operator's nightmare of up to $140 million annually*. And as cable systems increase their Pay-TV services by adding 2, 3, 4 and more premium channels, the temptation to cheat will increase just as dramatically.

Trapping outperforms scrambling.

That's why major MSO's and independent cable systems alike are turning to Vitek traps to protect their programming and their revenues. They already know how trapping outperforms scrambling schemes in effectiveness and in reducing costs.

Traps are more effective because they can block out up to 4 separate channels or other combinations of tiers, *before* they enter the home. That eliminates the chance of cheating by subs who don't pay for the service. And, best of all, trapping means zero degradation for your pay subscribers, compared with reconstituted decoding techniques.

With today's multi-TV set homes, traps are more economical because they eliminate the need to install one or more descramblers inside every home in your system. That means substantially lower overall costs, whether you are adding new pay service, bidding on new franchises, or rebuilding your existing system. And only Vitek traps have a patented construction that makes them virtually maintenance free.

Vitek is the most effective trap.

When it comes to Pay-TV security, the most effective method you can use is trapping. And the most effective trap is Vitek. That's why over a thousand cable systems are already using Vitek single and multi-channel cable traps to protect their revenues.

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Don't Think Small. If your new or second TVRO plans call for a smaller dish with 6-8 receivers per polarization, look at value as well as cost. A 5 or 6 meter system may only cost you 10% more—giving you better performance now and insurance for the future.

Redundancy is in, in, in... Most operators of high revenue producing satellite earth stations back-up their service with fully redundant up-link and down-link equipment. Why? Because redundant equipment means happy subscribers and protection of your pay service.

Check out our 2-year warranty. Because our system has been field-proven for many years, we can offer a full 2-year warranty.

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Microband Seeking Five-Channel Pay Service

NEW YORK, NEW YORK—In a move which could pose a serious threat to the cable television industry, Microband Corporation of America has sought federal permission to develop a five-channel pay television service.

The company has filed a proposal with the Federal Communications Commission for creation of "wireless cable" systems in large urban markets. These systems, according to company officials, would utilize "cost-effective microwave" rather than coaxial cable.

The proposed systems, dubbed Urbanet, would expand the capacity of multipoint distribution service (MDS) common carriers from one to five channels and authorize three such carriers in each of the top 50 markets.

Multichannel broadband capacity would enable MDS systems to greatly expand upon current programming capabilities. Microband plans to distribute a variety of entertainment and information programs including two-way interactive services using telephone based return circuits. These could include teleshopping, security, energy management, and home banking in addition to pay-per-view special events, and teletext services—all services provided by cable systems.

Company officials acknowledge that they are seeking to directly compete with the cable operators, who now have a monopoly in providing broadband and narrowband communications services.

According to Microband President Don Franco, Microband's main objectives in making this proposal (contained in a 600-page document filed with the FCC) are to satisfy market demand in communities which do not have access to any multichannel systems, and to establish multichannel, over-the-air "wireless cable" systems in major urban markets in competition with traditional coaxial cable systems.

If the proposal receives FCC approval, company officials expect that systems could be constructed in all of the markets within 24 months from the initial grant, at a total cost of $35 million.

Microband is a subsidiary of Tymshare, Inc.

FCC: RCA Must Continue Tariff Specifications

WASHINGTON, D.C.—RCA Americom, which recently had the results of a transponder auction invalidated by the Federal Communications Commission, has been told it must continue to specify by tariff how it assigns its transponders on Cable Net I and II. RCA has been the only domestic satellite carrier required to include transponder assignments with its tariffs for the cable satellites. This requirement was imposed in 1979 because of the number of complaints the FCC had received about allocations. RCA requested that the commission remove the requirement or impose it upon all domestic satellite carriers. The commission cited the controversy over transponder allocations during the past year as the reason for continuing the requirement which applies only to satellites used by the cable industry.

MCI To Acquire Western Union International

WASHINGTON, D.C.—An agreement in principle announced between MCI Communications and Xerox last December 15 has now been followed by a definitive agreement. The move will allow MCI to acquire WUI (Western Union International), Inc., a wholly owned subsidiary of the Xerox Corporation.

In anticipation of the eventual agreement, both Xerox and MCI have filed the necessary applications with the Federal Communications Commission. Approval by the FCC will allow the eventual transfer of WUI's licenses to MCI.

Z-TAC Converter Chosen By Cablenet, Inc.

CHICAGO, ILLINOIS—Zenith Radio Corporation has announced that their Z-TAC cable TV converter system with 120-channel capability has been selected by Cablenet, Inc., for use in 10 Chicago suburbs.

The Z-TAC system was chosen because of its 120-channel capability, secure scrambling techniques, and other features that will allow Cablenet to meet franchise requirements, according to Robert McRann, Cablenet executive vice-president and chief operating officer.

In addition, the 440 MHz Z-TAC converters offer A/B switching for dual-cable operation, full head-end addressability, and up to 20 service categories for pay programming. The system will allow Cablenet's subscribers to lock out any programming they might consider objectionable for children through Z-TAC's Parental Guidance Control. It will also allow subscribers to select their favorite channels preprogrammed into the decoder's microprocessor-based memory, and to control volume, channel selection, and TV set operation through the system's wireless remote control unit.

Cablenet is scheduled to install the Z-TAC system throughout the 10 northwest Chicago suburbs: Arlington Heights, Bartlett, Des Plaines, Hanover Park, Mt. Prospect, Park Ridge, Prospect Heights, Schaumburg, and Wheeling, by late 1982.

RCA Introduces New 58-Channel Digital Converter Series

VAN NUYS, CALIFORNIA—RCA Cablevision Systems has introduced a new series of 58-channel digital set-top converters for operators of 400 MHz systems.

The new Series KS pushbutton converters feature a microcomputer design that incorporates frequency-synthesized tuning with AFC for automatic, precise channel tuning.

The optional decoder for the Series KS converters is a field programmable, all channel in-band decoder which will accept up to 16 tag levels of pay services for flexibility in tiering of programming. The RCA design for the decoder provides a simple yet highly secure authorization of desired channels.

As a standard feature, the converters are field switchable for HRC or IRC channel assignment. In addition to decoder capability, options include cordless-remote operation and an electronic A/B switch that doubles channel capacity to 116 for dual-cable systems. The Series KS converter's memory can store up to 15 channels, selected randomly from the A cable, B cable, or both.

The converters have been designed to add a future addressability option that will provide control of subscriber service from a central office.

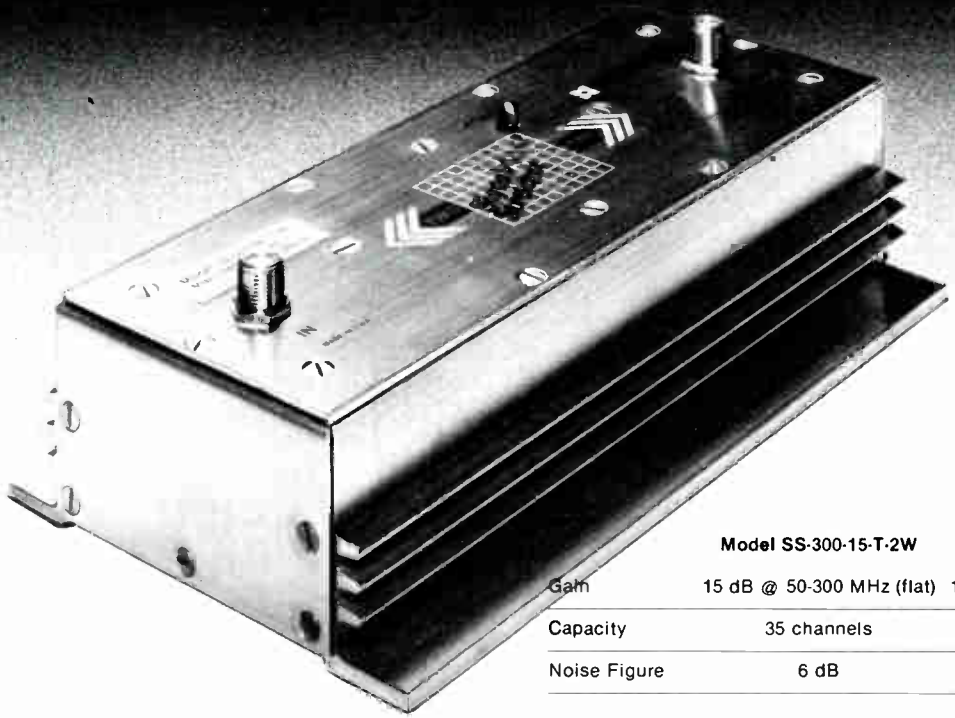
TBS To Buy Wegener Equipment For CNN Radio Network

ATLANTA, GEORGIA—Wegener Communications has announced that the Turner Broadcasting System will purchase the Wegener Series 1600 subcarrier transmission system for its CNN Radio Network, scheduled for launch March 1.

TBS will use the spectrum-efficient transmission system on Satcom III-R, transponder 14, to provide a full 15 kHz

Another Broadband First: The Two Way Signal Stretcher

Broadband's latest high performance house-drop amps provide full two-way capability.



	Model SS-300-15-T-2W	Model SS-440-14-T-2W
Gain	15 dB @ 50-300 MHz (flat)	14dB @ 440 MHz (sloped)
Capacity	35 channels	54 channels
Noise Figure	6 dB	8 dB

You already know about Broadband's 300 MHz and 440 MHz Signal Stretchers. You know how they provide near-transparent amplification for feeding long drops, multiple TV sets and multiple dwellings.

Now we've fitted both models with two-way capability. With this new feature return signals may now be sent from the home terminal back to the source using the 5-30 MHz band. Designed for systems currently two-way or scheduled to go two-way, Broadband's Two Way Signal Stretcher stands alone in its ability to serve this dual function.

Both models feature push-pull circuitry and offer high output capability. Unlike most amplifiers in the house-drop category, Broadband's Two Way Signal Stretchers are capable of full channel loading at extremely low distortion levels.

Signal Stretchers are powered by a UL-approved, Class II transformer that may be located remotely from the amplifier. This adds to their flexibility - the location of the amplifier need not be dictated by the location of a 110 VAC outlet.

Broadband-engineered, Broadband-tested and Broadband-guaranteed for high quality performance, the Two-Way Signal Stretcher represents the latest achievement in Broadband's continuing effort to meet your system's special needs.

For free specification sheets and pricing, call our toll-free number (800-327-6690) or write Broadband Engineering, Inc., P.O. Box 1247, Jupiter, Florida 33458.

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monaural program channel radio service to radio stations subscribing to the CNN Radio Network. The network will also be able to provide automation control signals to its affiliates through a three-function sub-audible tone control system.

Additionally, Wegener was scheduled to announce two additions to its series 1600 cable stereo product line at the Texas CATV Show in San Antonio. The Model 1693 Stereo Synthesizer is a plug-in module capable of converting monaural audio input into left and right channel audio outputs. Active filter circuitry will improve the sound quality of monaural sources.

Model 1694 Stereo Line Interface Card will allow accurate and convenient interface for external audio sources transmitted on cable FM. It is a plug-in module system providing dual LED level indicators and over-deviation protection circuitry.

RCA To Build All Solid State Satellites

PRINCETON, NEW JERSEY—RCA American Communications, Inc., has awarded RCA Astro-Electronics a contract to design and build the first all solid-state communications satellites. Charles Schmidt, division vice president and general manager for RCA Astro-Electronics claims, "These satellites will have the most advanced design of any in-orbit or proposed C-bank communications satellites."

The new satellites will incorporate solid-state power amplifiers (SSPAs) rather than the traveling wave tube amplifiers (TWTAs) previously used. In addition to offering greater reliability and durability, the SSPAs will extend mission lifetime to ten years. Satellite weight is increased from 2,000 pounds to 2,480 pounds.

The first satellite is scheduled to be launched in October 1982 and has been sold to Alascom, Inc. It will be used to service Alaska and will be operated by RCA American Communications as joint licensee with Alascom.

The second satellite, to be launched in March 1983, will replace Satcom I, which has been in orbit since 1975.

RCA Americom is now seeking Federal Communications Commission approval for its plans to launch the third satellite as a fifth operational satellite in September 1983.

SCTE News

Awards To Be Presented At SCTE Spring Conference

WASHINGTON, D.C.—The Society of Cable Television Engineers (SCTE) is hosting its Sixth Annual Spring Conference at the Copley Plaza Hotel in Boston, March 7-9. Included in the festivities is the Annual Awards Luncheon to be held at noon on March 8. This year's award for Member of the Year is to be presented to Clifford Paul, acting chief of the CARS Microwave Branch of the Cable Television Bureau, Federal Communications Commission. Paul is a Senior Member of the SCTE and has been a communications engineer for over 40 years, 20 of those years in cable television.

The Annual President's Award this year is to be presented to The Maryland-Delaware Cable Television Association for its outstanding accomplishments as a cable television trade association.

Other important activities of this year's conference are the morning and afternoon Selected Papers sessions on March 8, concluding with a speaker's reception and two sessions on March 9, one on Coaxial Cable and Fiber Optics and one on Engineering and Standards Committee reports. Noted experts in a broad range of fields will address the Conference attendees. Twelve engineering papers in all will be presented on topics ranging from two-way services, computer software and headend monitoring to enhanced audio, local origination and testing. On a lighter side, there are to be two special events luncheons and two hospitality receptions for those in attendance.

Business Notes

★ The **Society of Broadcast Engineers** (SBE) will give the certification examinations from June 18-June 26. All applications for this exam session must be received in the national office by April 26.

A copy of the Certification Program booklet and application may be obtained by writing to the Certification Secretary, P.O. Box 50844, Indianapolis, Indiana 46250.

★ **Swiderski Electronics Inc.**, of Elk Grove Village, Illinois, has been awarded a contract covering the design/engineering of the new television production facility for Caterpillar Tractor Company service training department located in Peoria, Illinois. The facility is scheduled for completion in early 1983.

In addition, Swiderski Electronics has also been awarded the total systems contract covering the entire audio/video communications facilities for the City of Faith Medical Center at Oral Roberts University, Tulsa, Oklahoma. The entire system package will be constructed and tested in Swiderski Electronics' 40,000-foot facility before shipment to the City of Faith Medical Center in Tulsa.

★ **Atlantic Research Corporation** has announced the opening of its FCC Compliance Testing Laboratory. This full service testing and engineering facility features: personnel experienced in FCC testing, personnel experienced in equipment design and modification for control of EMI, latest quasi-peak detection test equipment, remotely controlled open field radiation test site, 100 dB shielded enclosures, 50 microhenry LISN's, fully equipped electronic laboratories, and a model shop.

Complete FCC applications are prepared, as well as test reports.

For more information contact Atlantic Research Corporation, FCC Compliance Testing, 5390 Cherokee Avenue, Alexandria, Virginia 22314; (703) 642-4174.

★ **SatCom Technologies, Inc.**, has received orders totaling more than $600,000 in recent months for satellite earth station antennas to be used at TV broadcast stations. Six contracts were received from **MACOM Video Systems, Inc.**, of Burlington, Massachusetts, to provide 7-meter and 9.2-meter antennas as part of turnkey earth station packages MACOM offers to broadcasters. Most antennas include high speed (2°/sec) drive systems with microprocessor-based programmable controllers for accessing and storing up to 39 satellite positions. By using the controller's scheduling function, the broadcaster can program the antenna to point at different satellites automatically over a selected time period.

★ **Harron Communications Corporation** has agreed to purchase $1.7 million worth of converters from Jerrold Subscriber Systems Division, **General Instrument Corporation**.

★ **Scientific-Atlanta, Inc.**, has received a cable equipment order for approximately $1 million from **Dowden Communications** of Atlanta for its Germantown, Tennesse, cable television system. The order includes an 11-bay, 54-channel headend, two satellite earth stations, complete distribution electronics with coaxial cable, taps, passives and set-top terminals. The equipment will be used in the 100-mile system serving subscribers in Germantown. Delivery of the equipment for the 400 MHz system began in December, 1981.

★ **Oak Industries Inc.** has announced it will begin an over-the-air subscription television (STV) service in Houston, Texas, by mid-1982. Oak said its Oak Communications Inc. subsidiary has reached a joint venture agreement with **Channel 20 Inc.**, a Texas corporation, to provide the STV service. Channel 20 Inc. has received STV broadcast authorization along with a grant for a broadcast license for a UHF television station from the FCC. Broadcast facilities are now under construction by Channel 20 Inc., which will operate the station. Oak will own 74 percent of the STV service and Channel 20 will own 26 percent.

★ **C-COR Electronics** reports a net income of $800,000 on sales of $5,830,000 for its second quarter ending December 31, 1981. This represents an increase of 147 percent over sales for the second quarter of 1980. Earnings per share for the quarter ending December 31, 1981, were 26 cents compared to 12 cents for the same quarter of the previous year. In addition, C-COR has exceeded 500 employees for the first time in its 28-year history. The total figure, 503 employees as of December 31, 1981, represents 406 personnel in manufacturing with the remainder in indirect and administrative personnel. Less than one year ago C-COR's total employment was 339.

★ **Sharp Electronics Corporation** has been awarded a GSA contract covering its XC-700 broadcast video camera and all of its accessories. The contract number is GS-OOC-90454, and it is in

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- We successfully handle the full range — from the very simple systems to San Antonio's 3,400 mile, 9-headend complex — completed as your schedule demands.
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We offer a 100% Computerized Quality Control Inspection Process unique to the industry! We reprocess the entire completed design back through our computers to eliminate 99% of the errors that ordinarily become built-in system problems.

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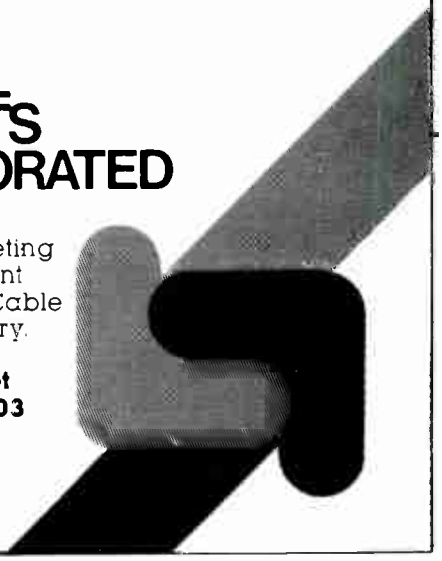


effect December 3, 1981 through September 30, 1982. For further information, contact Mr. Garbutt at 10 Sharp Plaza, Paramus, N.J. 07652. (201) 265-5548.

★ **M/A-COM Inc.** has announced that one of its operating companies, **Microwave Associates Inc.**, has received two equipment contracts; one from **Cincinnati Microwave** of Cincinnati, Ohio, and another from **Controlonics Corporation** of Westford, Massachusetts. The Cincinnati Microwave contract calls for voltage controlled oscillators and semiconductors that will be used in police radar detector devices. The Controlonics Corporation contract calls for microwave semi-conductor diodes that will be used in radar devices and radar receivers.

★ A 7% price increase, effective April 1, 1982, for cable television coaxial cable products has been announced by **Times Fiber Communications, Inc.** According to TFC, orders placed on or before April 1, 1982, for delivery prior to May 1, 1982, will be accepted at current prices. Orders placed after April 1, 1982, will be entered at the new prices in effect at that time.

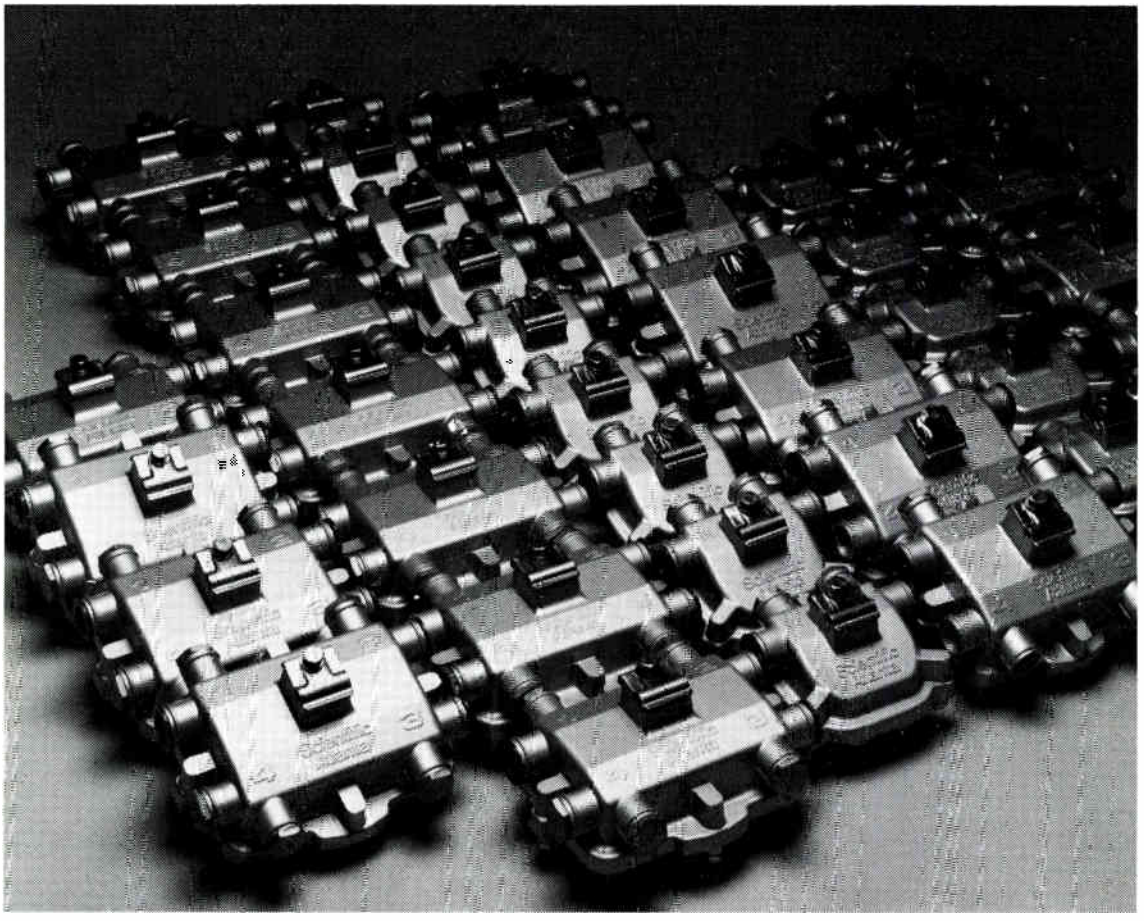
★ **Harris Corporation** has been awarded a three-year, $30 million development contract by the Navy for work on a new military satellite communications program. The **Naval Electronic Systems Command** announced last week that it had awarded Harris initial funding of $3.4 million to start work on the project, which involves "extremely high frequency" (EHF) satellite communications terminals. Under the $30 million effort, Harris will deliver six full-scale development models of the next generation satellite stations, which will be used by ships, submarine and shore bases. The EHF terminals are expected to significantly improve the Navy's anti-jam and "low-probability-of-intercept" capability, according to Harris Corporation.

★ Fred Kornberg, chairman and chief executive officer of **Comtech Telecommunications Corporation**, has reported that the United States Army Contract Adjustment Board authorized a $17.5 million contract price increase to Comtech pursuant to its previously-announced request for extraordinary relief. Under the board's decision, the contract value of Comtech's medium terminal contract with the U.S. Army, which was awarded in 1978, will now be increased to $69.7 million.

The board's action will also allow Comtech to repay its bank loans which presently exceed $8 million with $5 million that will become immediately payable upon adjustment of the contract price and a government loan which will be repayable over a five year period beginning June 1984. Additionally Comtech's contract costs will be fully reimbursed on a current basis. The contract price increase and loan will be embodied in agreements consistent with the terms and conditions of the board's decision.

★ The **Trinity Broadcasting Network**, in a joint venture with Bay Area Christian Broadcasting, is now supplying Gill Cable of San Jose with local and national religious programming. The combined programming, which began January 1, 1982, will reach over 89,000 subscribers. Bay Area Christian Broadcasting will carry five local origination programming at various times throughout the week, and TBN will be carried the rest of the time. BACB's programs will be produced in conjuction with the local churches in the bay area. A special Hotline phone bank was also installed, and all phones were reported busy during the hours of the first five local programs. TBN is working with other local groups throughout the U.S., and all indications are that this cooperative effort is a tremendous success.

★ **Oak Industries Inc.** has formed a new subsidiary, **Oak Satellite Corporation**, to consolidate and develop the company's activities in satellite communications.



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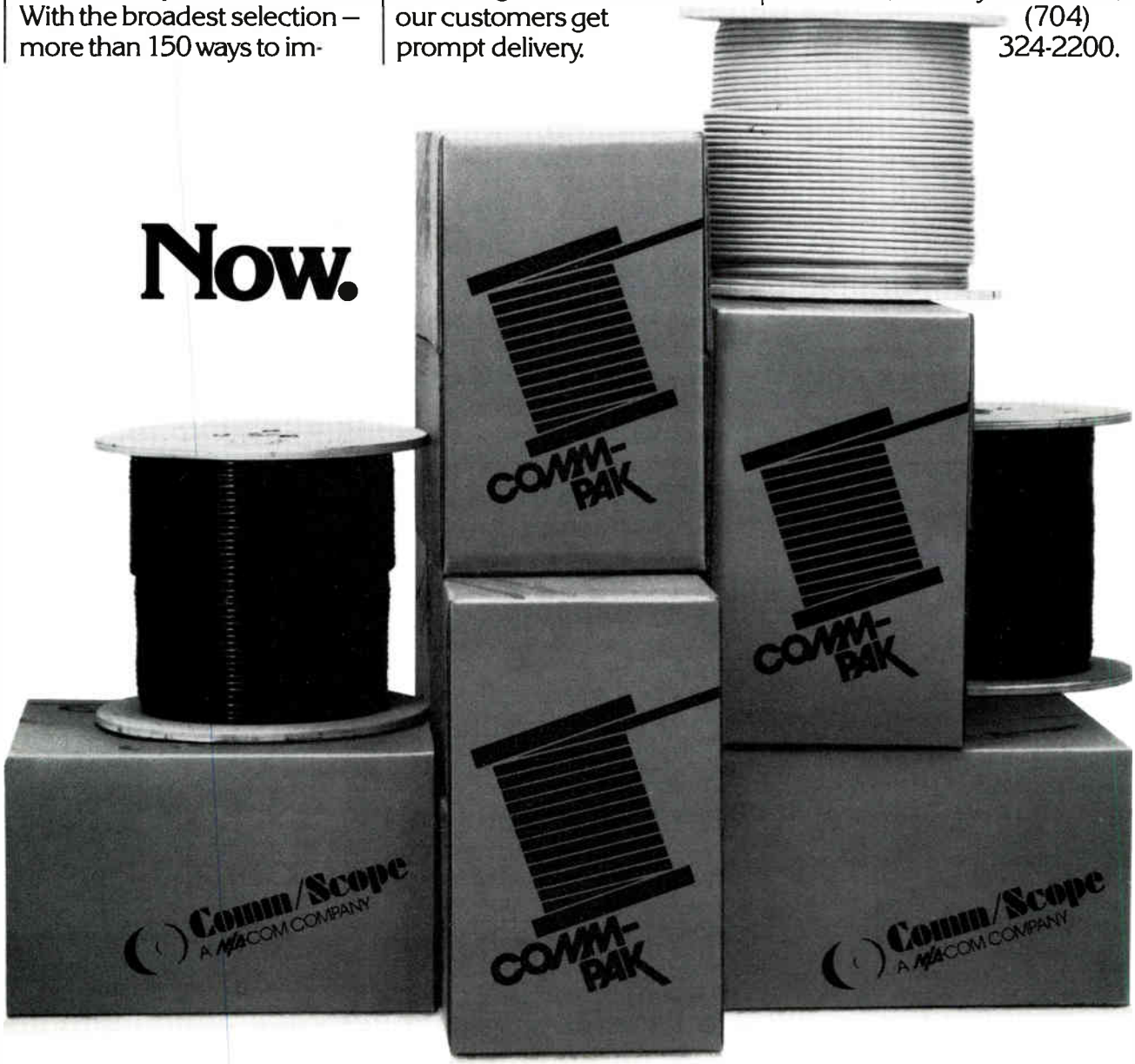


Rebuilds: Upgrading CATV Systems For The 1980s

By Charles R. Castilano, manager, Jackson Tool System Division.

The purpose of this article is to provide an overview of some of the economic, procedural and mechanical considerations that result in the decision to rebuild an existing system. Certain aspects are discussed in depth. They are:

- Decisions to be made by the system operator before the project begins;
- An understanding, by the operator of the problems unique to a rebuilt vs. a new system;
- The construction methods involved and;
- How to handle both the old and the new system as the cutover takes place.

Rebuilds in the 1980's are a must. Their successful completion depends on careful planning and execution by the system operator, power and telephone representatives, and the contractor.

Economic Reasons

We are seeing the franchise process taking place in many of the major markets. Before long, few markets will be without cable television. But what about those systems built 20, 10, or even 5 years ago? At best, they were built with the "state of the art" equipment of the time. By today's standards, the design, electronics, and cable used in those systems are outdated. Twelve-channel capacities have been exhausted. The consumer demand for more services and channels, better quality reception, and minimum maintenance creates the necessity to rebuild, or perhaps the preferable term is upgrade.

The primary reason to rebuild or upgrade a system, then, is to eliminate the deficiencies while preparing for future growth in terms of services and subscribers, which will result in increased revenues.

The operator must look at the entire rebuild of a system as a series of smaller rebuilds, each a carefully planned manageable phase. Priorities must be assigned to the various phases. The

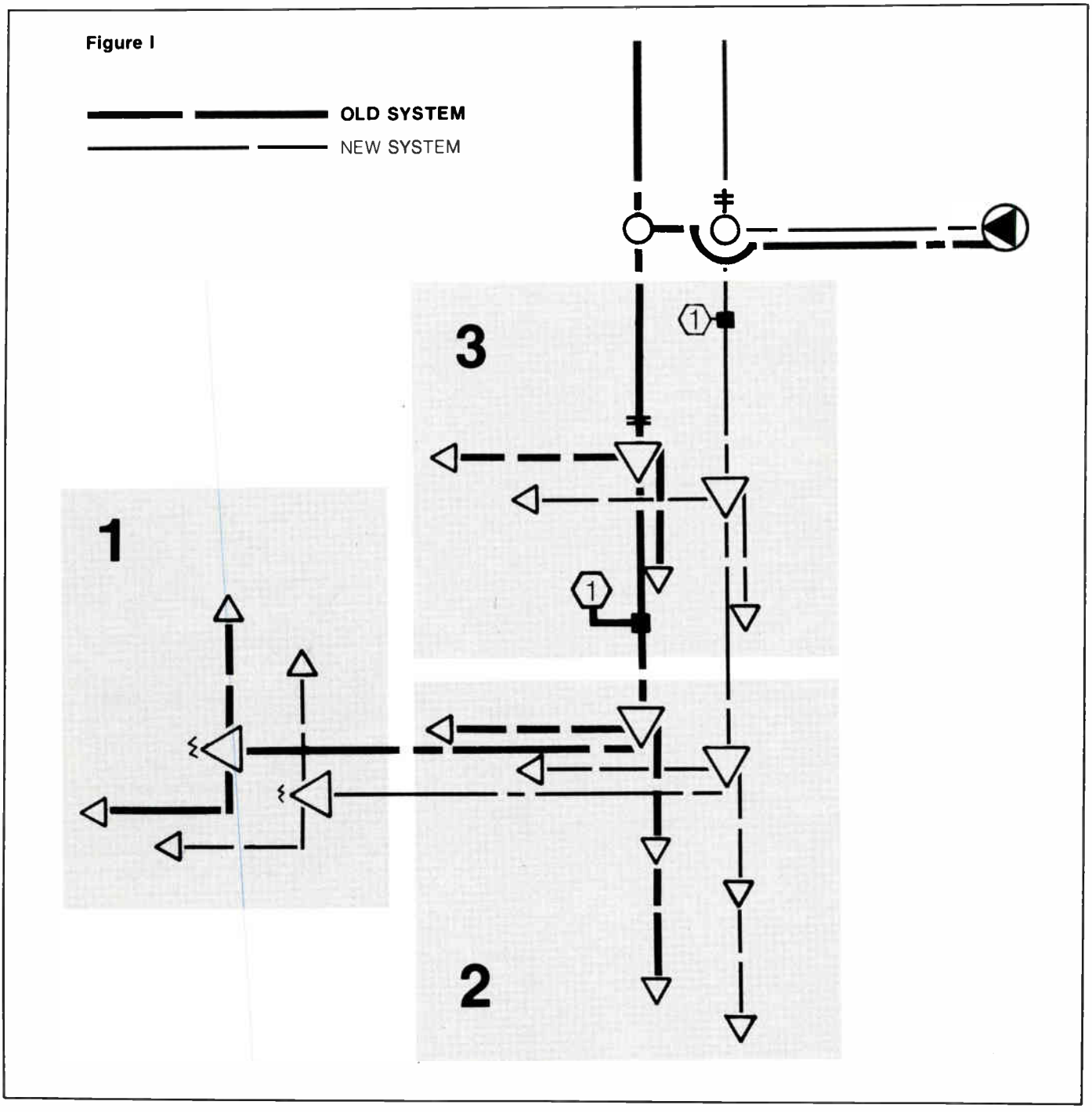
oldest section of the plant is not necessarily the first to be replaced, nor is the area of the highest potential increase in subscribers. There has to be an overall plan, one that can be completed in the shortest amount of time per dollar spent. In any rebuild, the longer the time two systems are operational, the greater the cost.

The Plan

The system operator, utilities, and contractor must agree on specifications of the rebuild before the actual construction begins. Experience has shown that disagreement on specs such as pole clearances, road clearances, and electronic equipment placement after the contractor begins, can lead to costly delays in the project. We have found that safety code books may be inadequate if followed verbatim - more stringent specs may exist for a geographical area. Codes established by local government authorities or utilities in certain geographic areas can be "tougher than the book". In all cases, the most stringent specs prevail, unless all parties involved agree to change them prior to construction. Unusually tough specs, which would result in massive make-ready cost, will probably be negotiated to a middle-of-the-road final draft. It is in the best interest of the operator to get a modern cable system for subscribers, while maintaining a safe, workable environment for the utilities and cable contractor.

The operator needs to know how many miles of plant exist in the old system. A reputable system mapper, such as Jackson Enterprises, should be contracted to accurately produce as-built maps and new maps where needed. The upgraded system cannot be designed without them. Recently built extensions to the old system may not need to be rebuilt. The operator should make sure that existing electronics are identified and located properly. Fast turnaround time on maps is important. Jackson Enterprises uses a computer-aided strand mapping and drafting

Figure I



system which enables rapid production of high quality maps (see Table I). As the operator makes changes to the system in the future, maps should be updated. Computer generated maps allow the storage of many layers of information to aid in the design, splicing, marketing, etc.

Preconstruction Considerations

The operator and contractor agree on an overall plan based on priority phases. If the system has to be redesigned, the drops will have to be changed. An agreement must be reached on who will transfer the drops and what drops will need to be updated. Often as much as 60-70 percent of drops will have to be replaced.

It has been said that the operator faces two types of questions before construction begins, "Do you have this?" and "Can you do that?"

The operator must plan to have:

1. Proper maps, both old and new design.
2. Personnel to keep the old system operational.
3. Personnel to verify that old and new equipment will be compatible.
4. Personnel to work with utilities.
5. A construction manual illustrating methods of building and rebuilding.
6. Preconstruction questions answered.
7. A sufficiently large warehouse for materials, and space for wrecked out materials.

The operator must be able to:

1. Control materials in and out of the warehouse.
2. Coordinate as-built maps with the mapping and design of the new system.
3. Coordinate quality of materials and workmanship between contractor, cable companies and utilities.
4. Get materials on time.
5. Have personnel to assemble and burn in electronic equipment before installation, sweep cable, check and pre-cook converters.
6. Work with the schedule of the utility companies and perform whatever rearrangement necessary.

All of the above must be done on a timely basis.

Table I

Strand Mapping

Assisted by the "CABLEGRID 2000" computer-aided drafting system, Jackson Enterprises' strand maps include the following:

- Poles by ownership and usage
- Pole number if visible
- Transformer locations
- Existing guys and proposed guying
- Excessive make ready
- Street, street names, alleys and easements
- Span measurements
- Number of customers served from pole
- Map future construction or construction under way, where obvious, but no vacant lots.
- Location of headend, if known.
- Churches, schools, libraries, municipal, and government buildings.
- Aerial crossovers, slack spans, pole to pole and overhead guys
- Note rise poles
- Underground routing and pedestals
- Recommended pole sets where applicable.
- Four or more units are designated as apartments.
- Three or more units in buildings are included in housecount.

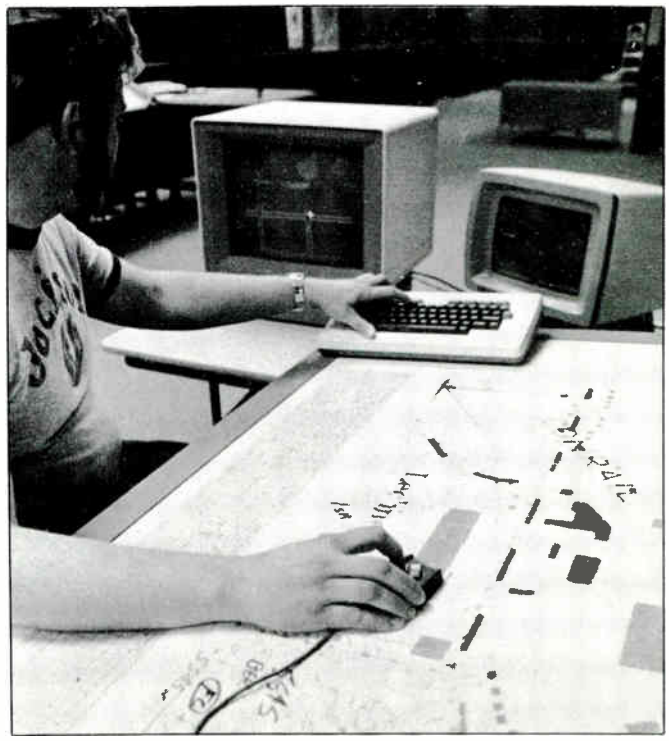
Construction

The usual construction problems faced by the contractor of a new system are complex. The contractor with rebuild experience will activate a new system while wrecking out the old system with an absolute minimum of service disruption for the subscriber. The contractor needs maps and material on time. Progress is dictated by the operator. Approximately 20 miles per month is a manageable number. The construction supervisor maintains enough crews, assigns trucks, and strives to keep a steady production pace. To rebuild 20 miles per month, a contractor would expect to need 6 construction crews (averaging 2-½ men per crew), 3 splicers, a balancing crew, and enough drop crews to average 6 to 8 drops per day, per man. The contractor is responsible for the old system from the strand to the house, and assigns wreck-out crews. Experienced wreck-out personnel are needed to prevent damage to the new plant.

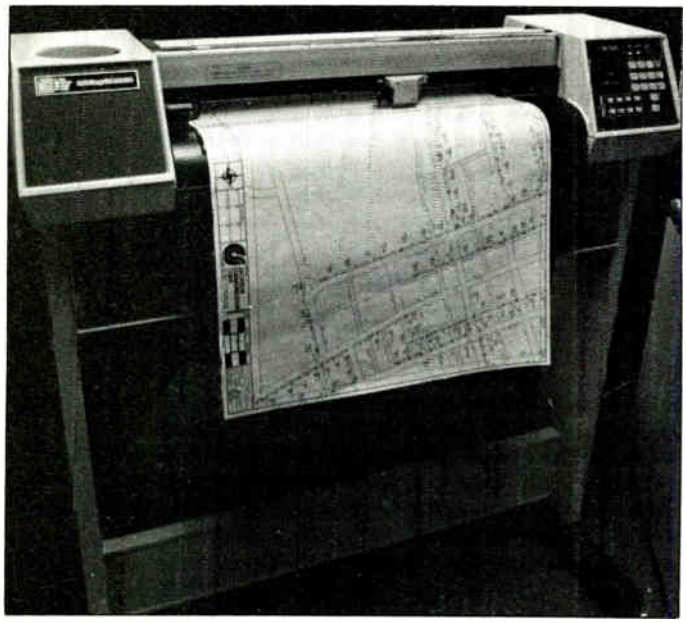
In the rebuild of most existing cable systems, the old system is raised 6 to 12 inches above the existing location on the pole. The strand is secured at every pole with a "J" Hook. At approximately every 5th or 6th pole, the three-bolt clamp, still tight on the strand, is secured to the pole with a "J" Hook. This prevents lateral movement of the strand if someone should pull on it or place a ladder against it. There can be no exception to this safety precaution. This method of temporary attachment provides safety to all personnel who may have contact with the old plant while in the temporary position. "Temporary" must be defined in the pre-construction meeting.

As in a new system, the quality of a rebuilt system is as good as its weakest component. Proper tensioning of the strand, adequate guying, safe bonding and grounding prior to placing the new cable are a must. Approved tools must be used in placing the strand and cable, providing safety for the linemen and the public below. Adequate expansion loops, cable rollers providing support and separation, and proper positioning of the cables and lashing techniques are required.

The changeover to the new system is accomplished by a series of carefully planned cutovers in controlled geographic areas. The new plant is activated and both systems operate at the same time. They both remain in operation until the drop is transferred from old to new. Figure 1 (see page 24) shows a portion of a theoretical system's trunk tree. The cutover begins in



Programming on CABLEGRID 2000



Jackson Enterprises' CABLEGRID 2000, *computer-aided drafting system*

the extremities of the system, progressing toward the headend. Geographic areas are defined by power supply location. Drops are changed to the new system already in operation, resulting in a minimum of service disruption. Once a geographic area is activated, wreck-out of the old system can be done quickly.

Finally, it is beneficial for the cable operator to have sales personnel explain the use of the new converter as it is installed and to sell additional services. It's a good idea to have enough sales personnel to keep up with the drop crews, or the new service will not be made fully available to the subscriber.

In Summary

Rebuilding an existing cable television system is a challenge for both the system operator and the contractor who tackles the project. An ideal rebuild takes place rapidly, with minimal disruption of service to the customer. A successful system rebuild is the result of careful planning and communication between operator, utility representatives, contractor and subscriber. A successful outcome to a project of this sort is worth the sweat and energy expended.

The story, photos and illustrations were submitted by the following personnel of Jackson Enterprises. Richard L. Jackson, Owner; Hazel J. Kenney, General Manager; Charles R. Castilano, Manager, Jackson Tool System Division; Joseph W. Taylor, Manager, Cable Television Division; and William S. McCarthy, Operations Manager, CATV.

Jackson Enterprises has successfully rebuilt the following systems: Starting with the Cumberland, Maryland system in 1966, once the nation's largest; then Altoona, Pa. system; London, Ky., one of the country's oldest systems; Canton, Ohio, a telephone leaseback system; Danville, Va., Lima, Ohio, and numerous other systems totalling more than 5,000 miles.

Charles R. Castilano, Jr. is the manager of the promotion and tool division of Jackson Enterprises. Prior to that Mr. Castilano was materials manager for Information Transfer Industrial Inc., of Holcomb, N.Y. He received a bachelor of fine arts degree from the Rochester Institute of Technology where he majored in industrial design.

Upgrade Vs. Rebuild: A Question For The Eighties

*by George Sell, editor, **CED** magazine*

The big decision facing many system operators and chief technicians is whether to upgrade or rebuild their system. The situation is indeed complex with so much unproven technology, scarcity of experienced technical personnel, high cost factors, and difficult to predict revenue potential. But with many systems facing re-franchise or the threat of over-build as well as the problem of channel scarcity, decisions must be made judiciously and soon.

be best to start by defining two terms, upgrade and rebuild. An upgrade is a different game than rebuilding. Upgrading involves improvement of the performance of an operating system by testing and isolating specific elements and replacing or repairing those elements on a piecemeal basis. On the other hand, rebuilding involves major wholesale replacement of the plant or, in other words, a nearly complete new-build over the existing old system. Now, to further split hairs, it might be possible to talk of partial rebuilds such as complete rebuilding of a trunk system, electronics, trunk cable and all.

To replace just the electronics would constitute an upgrade. But, the question of whether to upgrade now and rebuild in the future versus rebuilding plant now, has many subsidiary questions.

Big Questions

Before system operators and chief technicians can approach this decision many questions must be addressed. First of all, what are a system operator's performance goals? Is channel capacity the only reason for upgrading or rebuilding? What design factors must be considered in improving the performance of a system? Should a system operator test an existing system to determine how to plan an upgrade? How do system operators go about picking a contractor? Can an owner of a system improve the bottom line in the make-ready survey? In planning an upgrade or designing a rebuild, how can an operator avoid future rebuilds? We spoke with several chief technicians and engineers in systems that are in the midst of the decision-making process. Opinions expressed were not unanimous.

Conflicting Interests

For owners and managers, what is of

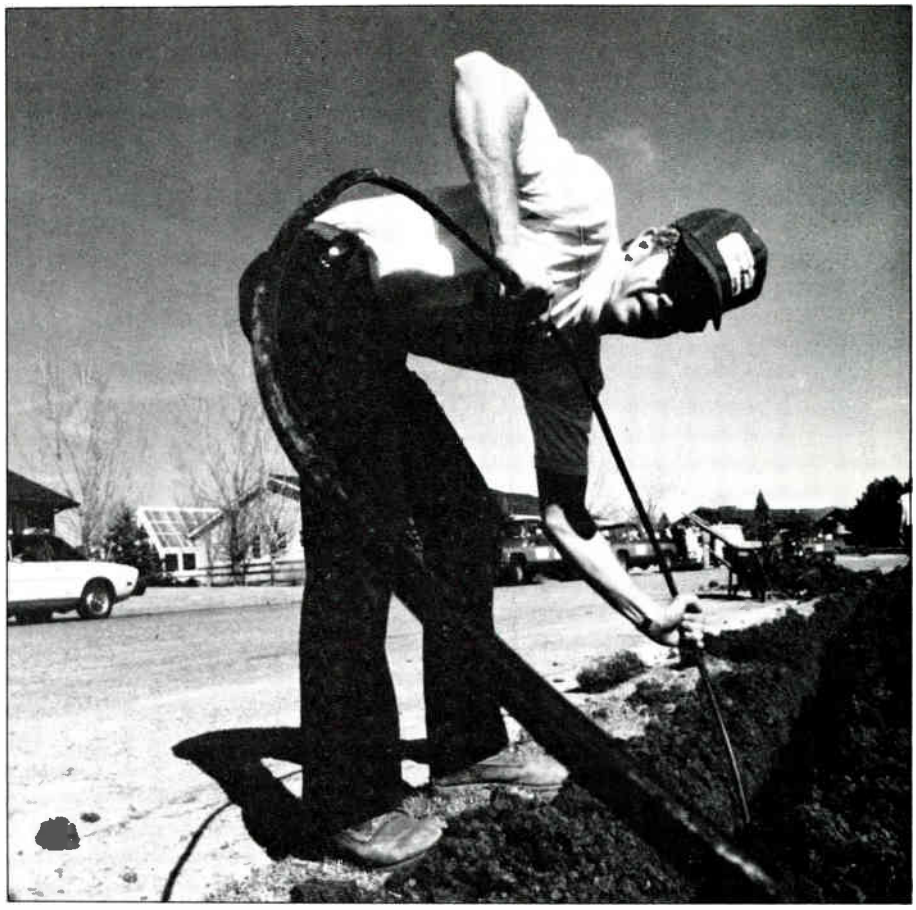
Construction expenditures

New plant construction In miles	1981 Actual	1982 Projected
Underground	14,110	18,607
Aerial	57,505	66,561
Total	**71,615**	**85,168**
Cost ($ in thousands)		
Antennas and towers	3,750	4,103
Microwave equipment	25,000	27,684
Headend	28,611	32,658
Line amplifiers	103,256	132,360
Cable—Trunk	81,810	98,373
Feeder	97,448	115,263
Drop	59,419	80,695
Taps and outlets	39,611	46,065
Converters—Nonaddressable	213,760	300,000
Addressable	53,440	96,000
Construction services	250,276	294,486
Earth stations	13,750	18,695
Pay TV security devices	53,694	67,653
Local origination equipment	24,164	30,737
Labor costs	270,154	353,029
Total	**1,318,143**	**1,697,801**
Replacement plant construction In miles		
Underground	7,247	9,376
Aerial	16,705	22,083
Total	**23,952**	**31,459**
Cost ($ in thousands)		
Antennas and towers	1,391	1,803
Microwave equipment	3,276	4,248
Headend	1,585	2,103
Line amplifiers	13,167	22,500
Cable—Trunk	11,538	17,964
Feeder	23,400	30,346
Drop	21,250	26,558
Taps and outlets	4,278	7,248
Converters—Nonaddressable	5,100	6,477
Addressable	750	1,413
Total	**85,735**	**120,660**
Grand total	**1,403,878**	**1,818,461**

These totals reflect a lower amount than projected in last year's construction expenditure as a major category has since been removed. The total miles include dual trunk, counted as two miles for each one mile strung, but do not take institutional loops into consideration.

interest is reduction of maintenance costs, increased revenue through high channel capacity, and better public relations. For chief engineers, priorities are a smoothly running system, good equipment, and a happy and competent technical crew. Many engineers and technicians desire challenging state-of-the-art high frequency system to run and tinker with. But rational planning must somehow bring the two interests together and temper these tendencies.

For owners it is necessary to realize that there are significant cost trade-offs in upgrading and rebuilding that involve close technical analysis. There are thresholds of channel capacity that will radically increase the upgrade cost if you cross them. Engineers and technicians must realize that their aesthetic preference for state-of-the-art equipment may not mean increased revenues or better picture quality at the subscriber's set. It is crucial that technical advice be sought by owners in their planning and that advice should be given judiciously by the technical staff, with management's upgrade or rebuild goals clearly in mind.



Unclear Goals

Establishing performance goals is the first stage in planning the improvement of a system. Will the goal be increasing channel capacity to obtain a better

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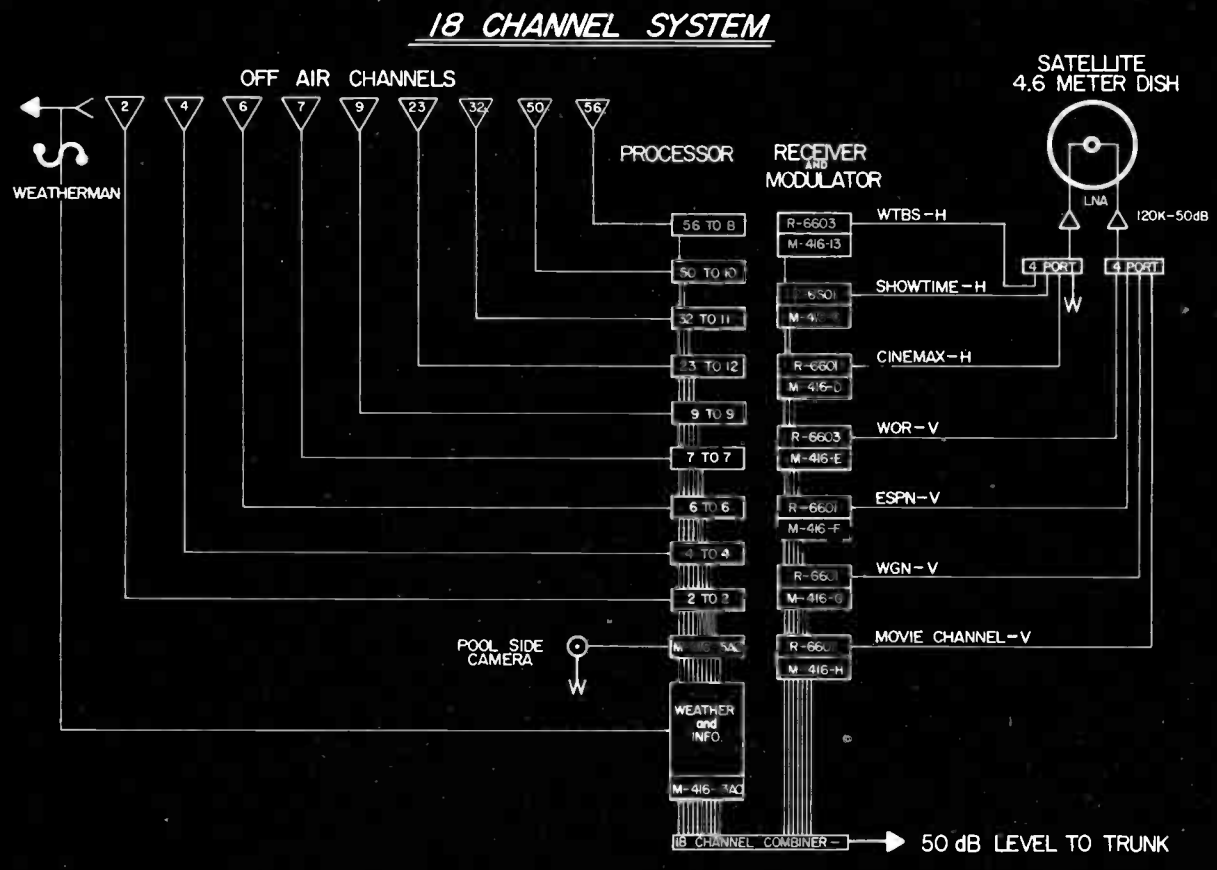

revenue picture? Or is the goal to be a better picture for subscribers? Is relief from refranchising constraints the ultimate reason for rebuilding? Or is a reduction of maintenance costs, the labor time involved in making trouble calls, and the need for better public relations the reason for technically improving the system?

A 12 channel system that is essentially channel-bound might want to pick up several of the satellite-fed networks so as to increase rates for basic service and add a pay tier or two as well. But operating a 216 MHz with no converters, there's little room for any new services to be carried. The ability to offer new services may be necessary for more important reasons than revenue. For many small systems that are up for renewal or franchise, the threat exists that other operators may be in a position to offer the city fathers what they think they want. City councils across the country are becoming well educated to the possibilities of cable television and are asking for more. For systems without the protection of an exclusive franchise, such as those in areas without home-rule, the threat of over-building by a neighboring system operator is ever present.

But how far does an operator go in upgrading a system so that it is cost effective? And will subscribers be willing to pay for increased services when it's all

Comparing Cost Per Mile: Mod Kits Vs. New Electronics.

Many system operators have upgraded their 12 channel systems to as much as 35 channels inexpensively by modifying their existing amplifiers and line extenders. The existing "electronics" are retrofitted by means of revamp units or mod kits. These amplifier refurbishing techniques (some are kits including circuit boards and plug-in modules and some are preassembled units that pop into the existing housings) are usually called mod kits.

One way to get a sense of the potential cost savings that can be had with mod kits is to look at a hypothetical 12 channel system. If the hypothetical system is thoroughly tested and the cable, both trunk and feeder, proves to be able to carry up to 300 MHz, and the line passives and drops are specified to handle such an increase in frequency and levels, then the system technicians must check to see if the amplifier spacing is adequate. Good amplifier spacing for an upgrade would be about 18 dB. If the system has a trunk-to-feeder ratio of 1 to 4, that is for every 10 miles of trunk cable there is 40 miles of feeder cable extending off of it, it would not be uncommon. Last but not least, the system would have to have old amplifiers of the type for which mod kits exist.

Given that this hypothetical system has one of the above types of old amplifiers, then it looks like a good candidate for an easy upgrade to 300 MHz or a 35 channel capacity with the appropriate 300 MHz amplifiers. Whether mod kits or wholly new amplifier stations are appropriate is a question system operators or chief technicians must answer individually. However, we can offer what the typical cost figures might be.

Supposing the hypothetical cable system referred to above has a 6 amplifier cascade in a 2.5 mile trunk run and given the trunk-to-feeder ratio of 1 to 4, the total system miles in this section of the system would be 10. This means the system would have 0.6 amps per system mile, which, if new trunk and bridger amplifiers cost about $1,500.00, would mean that $900.00 per system mile would be typical. If

mod kits cost comparably $340.00, then in this system the cost per mile for mod kits would be $204.00.

If it's further assumed that there are 25 line extenders in this hypothetical 10 system miles, then we would have 2.5 line extenders per system mile which would come to $1,000.00, if $400.00 is considered an average unit cost for line extenders. With the mod kits for line extenders running about $150.00, then it would be $375.00 per system mile for mod kit L.E.'s

So the comparative cost figures break out in the following way for this hypothetical 10 system miles:

6 amps @ $1500/amp ..... $900.00/system mile

6 mod amps @ $340/kit ..... $204.00/system mile

25 LE's @ $400/LE ..... $1,000.00/system mile

25 mod LE's @ $150/kit ..... $375.00/system mile

So for all the electronics in our hypothetical 10 system miles, the difference per system mile is $1,321.00 saved if the mod kits are used.

The reader must bear in mind that comparing mod kits with new amplifier stations is not an "apples-to-apples" comparison. Mod kits are filled into the old amplifier housings. While there is significant labor time involved in the installation of the mod kits, installation of complete new amplifier stations will involve removal of the old amplifier stations and remounting and connecting to the strand and cable. The new amplifiers include replacement of the entire unit and the total costs reflect this although the costs enumerated above do not include labor.

Old Amplifiers and Line Extenders That Have Mod Kits

Old Amplifiers	Manufacturers of Mod Kits
Jerrold Starline 1 Series (Amps) Jerrold Starline 1 Series (LE's)	**Superior Electronics Sarasota, Florida**
Jerrold Starline 1 Series (Amps) Jerrold Starline 1 Series (LE's) Jerrold Starline 20 Series (Amps) Jerrold Starline 20 Series (LE's) Jerrold Starline 20S Series (Amps) Jerrold Starline 20S Series (LE's) C-COR 100/200/350/400 Kaiser/Theta-Com Phoenician 1 Series SKL 7020/7030/7040 Anaconda (LE's only) 2033T/2130 8840/8841 AEL (LE's only) CVT2/CVT3/CVT4EU	**Broadband Engineering Jupiter, Florida**
Vikoa Futura 12 425/426/427/428 Vikoa (LE's) 461	**Camco Industries Woodbridge, New Jersey**

Note: Some amplifier manufacturers make retrofitting modules for some of their own old amplifier stations.

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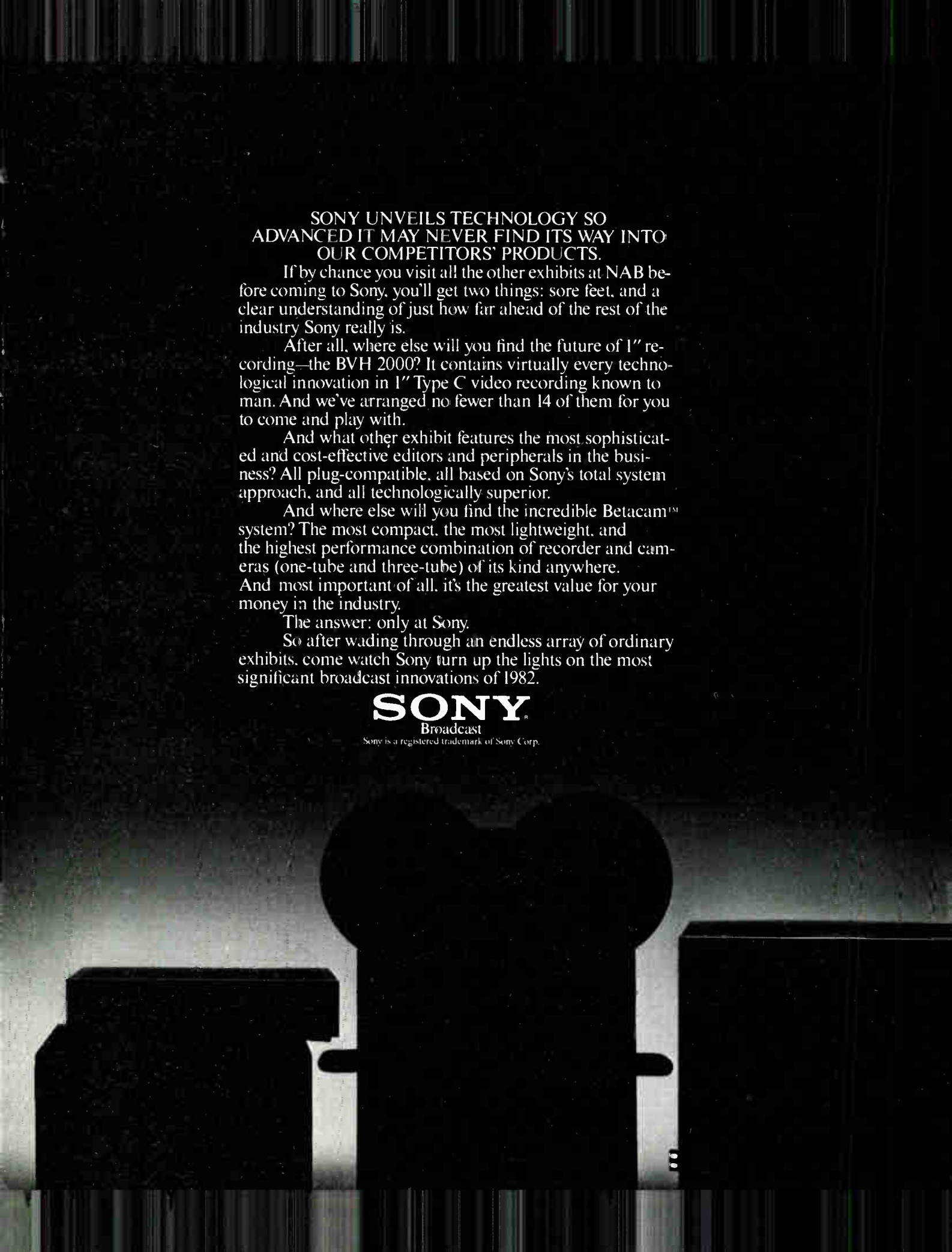

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said and done? Small systems with low capacity, with pressure on them from city councils, some sectors of their community, programmers, security service suppliers, data retrieval suppliers, and equipment manufacturers, are betwen a rock and a hard place. As Ted Hartson, manager of engineering services for Capital Cities Communications, points out, "If you could flip a switch and put a dual 400 MHz system out there, you can't get the revenue to support it. It's complex."

Design Factors

If a determination is made as to if and how the market will handle it, there are certain design considerations that must be examined in the process of planning an upgrade or rebuild. To go from a 12 channel one-way capability to 21 channel two-way can be relatively painless. A 12 channel system can replace its existing open-ended amplifier modules with push-pull amplifiers and that will give a system the mid-band channels of A through I. At the drop site, the operator must install block converters so the subscriber can pick up the additional channels using the channel selector on his or her set. "In other words, you would keep to 216 MHz or 220 MHz as your upper operational limit," says Hartson. "In that case you would be getting rid of the old single-ended amps, putting in push-pull so the second order beats and all of the unhappy distortion in the mid-band goes away. Then it would be simply a matter of just going back and getting the system into shape so that the 54 to 216 MHz response is good. Now, that would be safe."

But then you have taken a 12 channel system up to its maximum limitations. If an operator tried to move that kind of system into 300 MHz, he would be exposing himself to major rebuilding. Hartson continues, "The older 12 channel systems we were building operate with pretty hot bridger modules. It's not uncommon to run bridgers at 48 or 50 dB out. And now here's that old drop cable hanging out there. You're going to have to come back close to 45 or 46 dB for a single out-port in the bridger, so you've lost some signal there. You have the additional loss at the drop and now you're suddenly facing the fact you no longer hit the FCC minimum signal to the subscriber," Hartson says, "It's just all hooked together."

For some systems that have been maintained well over the years, and have the bandwidth in the existing cable and low amplifier spacing, the so-called "mod-kits" can be employed to take the system to as high as 300 MHz. Mod-kits are relatively inexpensive and the block converters simply require the subscriber to throw a switch to receive the additional channels.

Amplifier Spacing

Dave Large, vice-president of engineering for the San Jose, California system has had experience with the mod-kits in upgrading sections of his system. "The secret to this is, typically you have to space amplifiers in a strict way and the reason you can't just arbitrarily put new electronics in the same location (as the old amplifiers) is the spacing comes out funny," Large points out. Of course, the spacing Large is referring to is not physical spacing but electrical spacing expressed as cable attenuation in decibels. "If you've got 220 MHz and you try to build to 300 MHz, the line loss that worked for 220 MHz doesn't work any more at 300 MHz."

The higher the frequency, the greater the loss of signal strength as it travels the length of cable. If the system is a 220 MHz system with amplifiers spaced at 18 dB trunk attenuation, in taking it to 270 MHz the spacing becomes 20.16 dB. If a 12 channel system has 21 dB spacing, the change to 270 MHz would cause the spacing to become 23.5 dB. So, if the output of a trunk amp is 33 dB and the spacing is 20 dB down the cable to the next amp, you will hit that amp with 13 dB input. What compensates for the low input is the high gain of the next amp which will step up the output to deal with the next spacing with its losses of signal. What a

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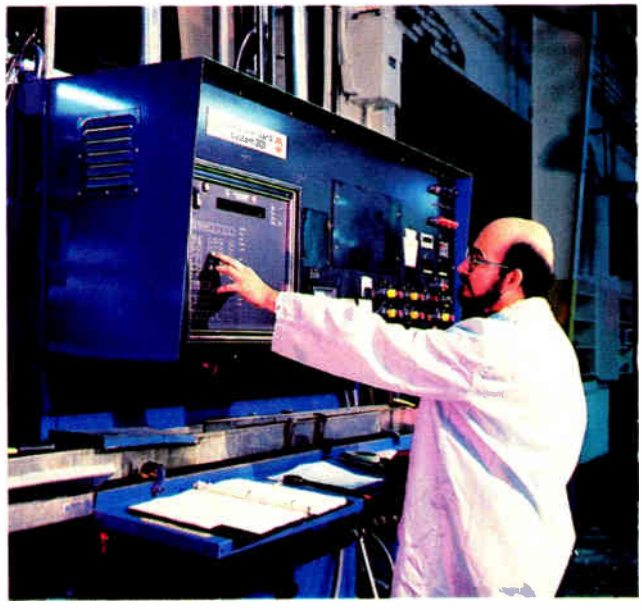

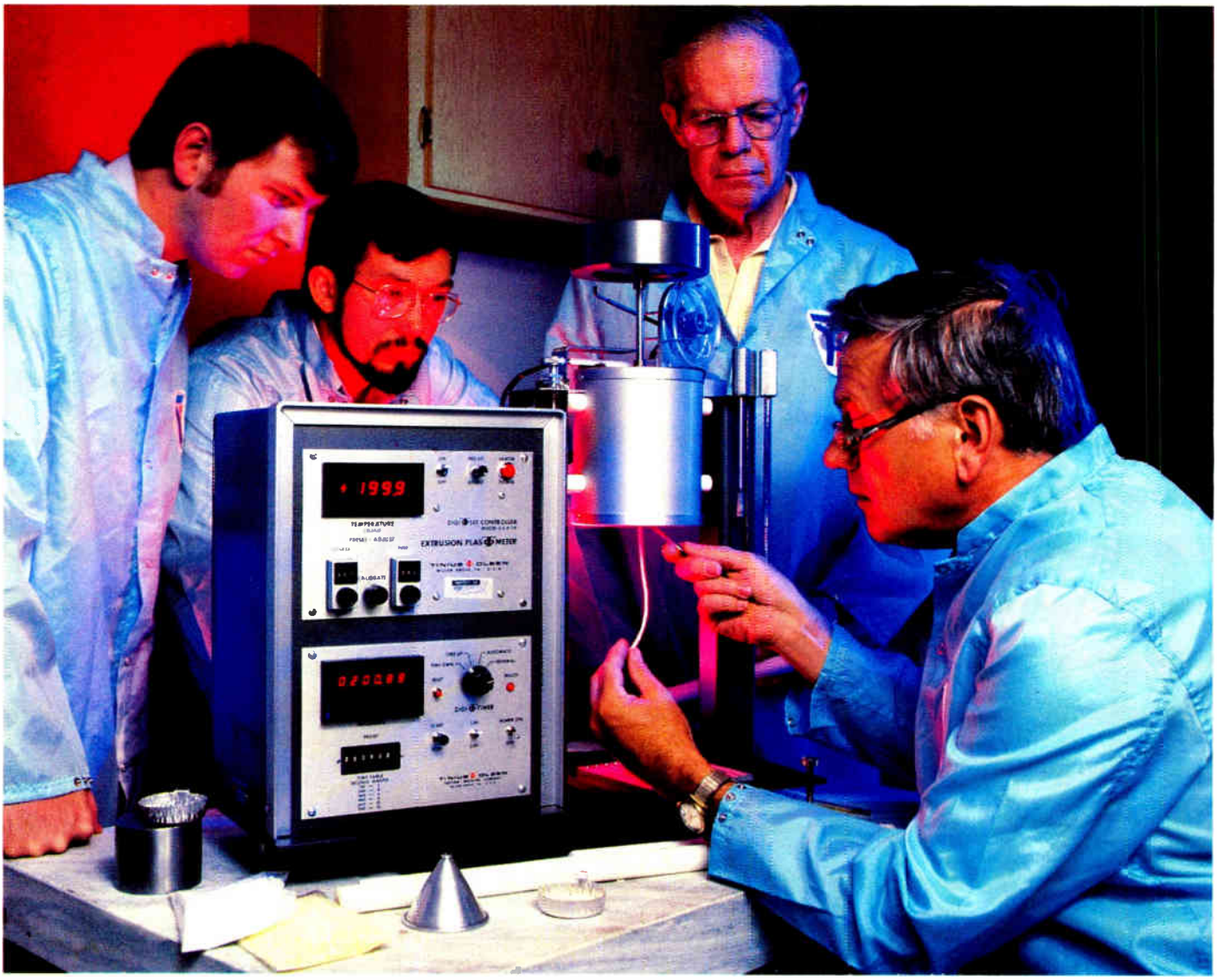

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system operator can do is take the existing signal losses as per the system's specifications, recompute the losses at new higher frequencies and see if new amplifier gains will carry the signal through the increased spacing losses. (For information on amplifiers, see the Product Profile section of the December, 1981, **CED** magazine.)

Degrading Systems

The original specs of a system will not help if the system is not performing well. "If you've waited to the point that the maintenance costs have gotten out of hand, you've waited too long," so says Ted Hartson. "You need to forecast your needs so the system isn't falling down around your ears."

The maintenance of a system can tell you a lot. "One thing that people fail to look at is the maintenance history of the system," suggests Andy Healey, chief technician of Rockland Cablesystems, in a northern suburb of New York City. The maintenance history may not be known if the system has had several owners. What was the track record of a system from an ownership standpoint? How many times has it changed hands? If a system has been passed around perhaps it has not been well maintained. There may have been morale problems among technicians who could not feel comfortable about their job security.

Without looking at the maintenance history, and just using the existing system's original specs along with the strand maps of the system, some MSO's will approach a small system that they own for an upgrade by having a centralized engineering department that is removed from the field, do the planning and financial analysis. This can be a mistake. "The financial analysis is a very simple one and will almost always come out in favor of upgrading," according to Healey, "but what they have to do is focus more on the technical aspect and really take a look at the condition of the plant, even from a purely aesthetic or maintenance standpoint. You can learn a tremendous amount about a system just by looking at it."

Strand Maps

What is required as part of the planning is a thorough "walk-out" of a system, making corrections on the original "as-built" strand maps. "Often a strand map is not really as-built," says Healey. Some sytsems will hold strand maps that reflect the original design of that system, but, "as we all know," Healey goes on, "the plant is

They Shoot Cable, Don't They?

"We don't have as much trouble with hunters as we do with plinkers, you know, the .22 caliber people taking target practice." So says Gene Fry, general manager of the Depoe Bay, Oregon cable system. The trouble seems to be that the locals here, as in many places around the country, take pot-shots at the birds who find aerial cable a convenient place to hang out. More often than not the birds' favorite stretch of cable is over a briar patch or river crossing. "The customers in the surrounding area, they don't much care what your problem is," Fry concedes.

Often the bullet ricocheting off the cable will cause an outage of service to a section of the system and it may require splices in the cable. "Anytime you have to cut and splice cable you're making another trouble point," claims Fry. Eventually these trouble points will contribute to the degradation of the system.

But more than the annual maintenance costs raised by trouble calls, the problem is a nuisance. "It's not so much an annual cost figure as it is a harrassment type of thing. The problem we have is just tracing down the problem when someone says they heard shots," according to Fry. "We will have some ghosting and some arcing and that type of stuff," Fry says. "The majority of the time when we're called out it's not when the initial shots were fired, it's when a bullet is lodged in the cable causing shorting in a section or it has opened up the jacket and water's getting into it."

In Oregon, more than the cable companies, it was the utilities that took the brunt of the trouble. "People like to shoot out insulators because they fly to pieces when you score a hit," says Fry. When the utilities banded together to push the Oregon legislature to do something about the problem, the Oregon Cablecom Association joined them in the effort.

According to Mike Dewey, the executive secretary of the Oregon Cablecom Association, the push was successful. In 1981, the Oregon legislature passed a law making it a crime to shoot a firearm in the direction of cable facilities or utilities lines. If caught, the plinker is fined substantially and if the marksman is a hunter, he or she will also have hunting privileges revoked. While its' enforcement is difficult, the law, which went into effect November, 1981, "May make people think twice before they shoot cable," Dewey says.

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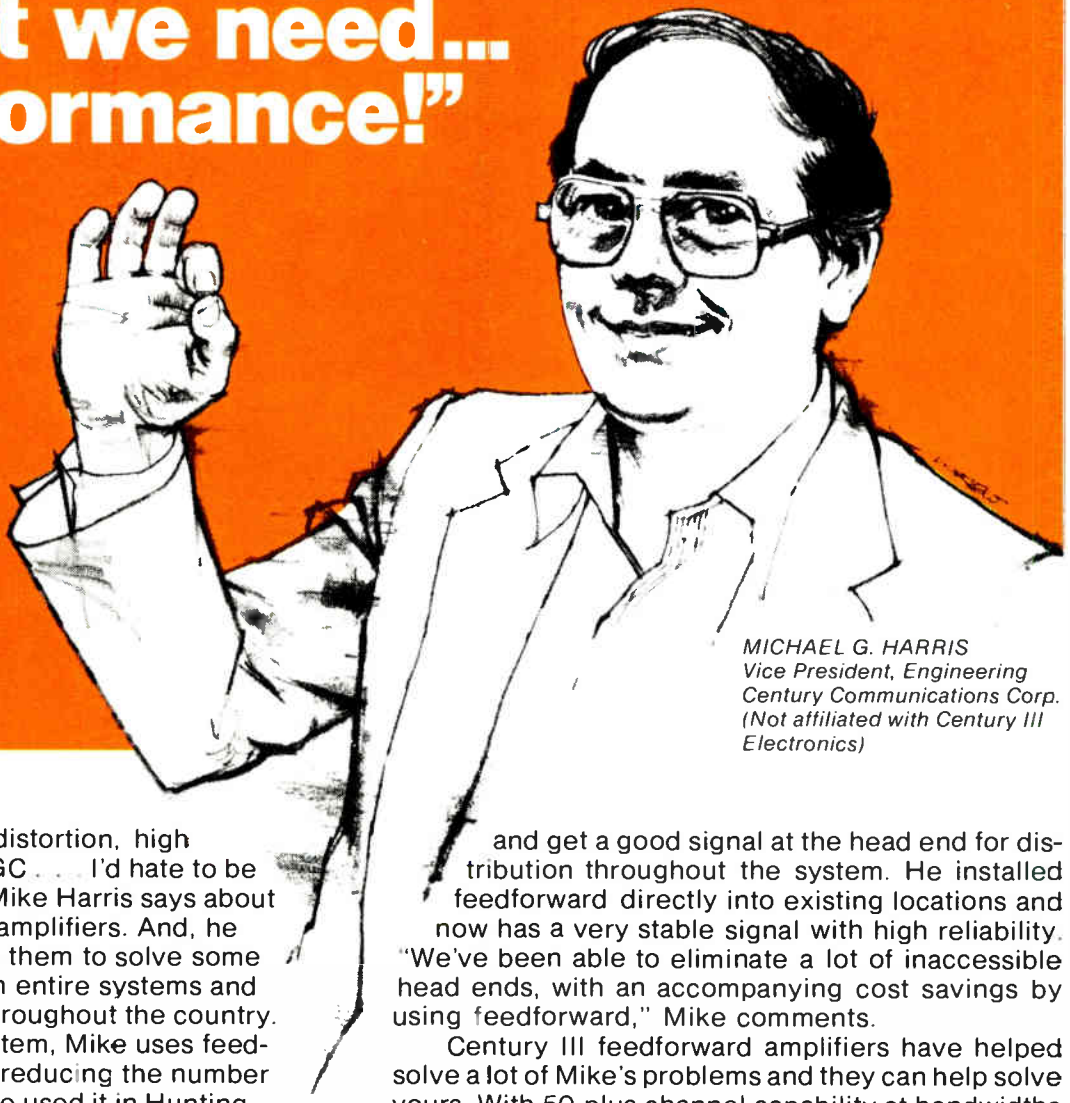

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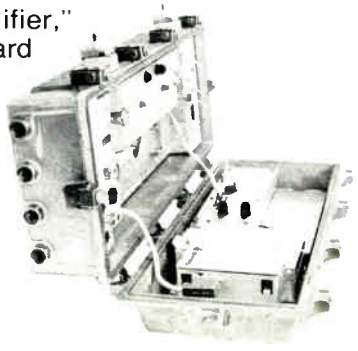
In a Connecticut system, Mike uses feedforward entirely, greatly reducing the number of amplifiers required. He used it in Huntington, West Virginia to upgrade a low band run to a 21 channel system by simply replacing the low band amplifiers with feedforward amplifiers. In Virginia, Mike had to contend with a dead run of cable 10 or 12 miles long through some very inaccessible areas. "It had to go 6,000 feet across a mountain without an amplifier," he says. "Use of feedforward made this possible." And, in San Pablo, California, Mike needed to increase his bandwidth and get a good signal at the head end for distribution throughout the system. He installed feedforward directly into existing locations and now has a very stable signal with high reliability. "We've been able to eliminate a lot of inaccessible head ends, with an accompanying cost savings by using feedforward," Mike comments.



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not always going to go up 100 percent the way it was designed. There are going to be field changes like, the guy doesn't want to pull a 90 degree bend in the trunk line so he'll skip a pole." Healey asks, "How often does that true as-built information actually get placed on the maps after the plant was completed?"

Splices Per Mile

A street-by-street survey or walk-out can supply an operator with much useful information. One criterion that might be employed for evaluating the condition of a plant is the number of splices between amplifiers in the trunk cable. Andy Healey suggests that five or ten between amps might be a guide. But whether this criterion is useful depends on how high the planned-for frequency is going to be

Ted Hartson doesn't see much use to such a criterion. "A good splice is capable of a 26 dB return loss. Now, most of the cable we put up in the old days didn't have a capacity much better than that," Hartson claims. He tends to take a conservative approach. "There's nothing wrong with a good splice. When you try to quantify that way you get into generalizing and that can get you into wasting dollars."

Testing For Upgrading

Hartson is an advocate of testing rather than street surveys. "The study and testing itself is going to tell you what to do," says Hartson. Referring to relying on the walk-out, Hartson offers, "Unless you can see those electrons, I think that's a mistake. Only through testing can you have the system speak directly to you." Hartson points out, "We have excellent equipment available to us now. The Wavetek 1855B/1865B sweep system is capable of 3 dB resolution."

While sweep testing may tell you if an existing system is performing to its original specifications, and therefore tell an operator whether to make use of those specs for planning a limited upgrade, will it tell you if the system can handle an increase of frequency? Andy Healey takes exception to the use of sweep testing. "You can't simulsweep (to see if passives or cable will have the necessary bandwidth) because the present electronics will limit the bandwidth range," Healey says. In other words, the upward frequency limits of the existing amplifiers will set the ceiling of the testing range.

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According to Healey, "You've got to pull the passive devices out of the system and test them at the bench."

In any case, thorough testing is a must. It may even show that upgrading may not be necessary. According to Hartson, "There are a lot of systems which, if they were just returned to their original operating parameters, would be a quantum leap over the way they're playing today." But Hartson qualifies his remarks by saying, "I don't want this to sound like Cap-Cities is saying, 'we're going to make these old dogs play for the rest of our lives,' and never put another nickel into them. We'll spend every dollar that results in some tangible benefit toward subscriber performance."

Picking A Contractor

Many of the larger MSOs have their own internal construction teams. But for MSOs without their own crews and independent systems, if cable is required for an upgrade or if a partial or full rebuild is to be done, a contractor must be brought in for the job. Some equipment manufacturers will do a turn-key rebuild with their own construction crews using their equipment. Also, there are an abundance of independent contractors.

But contractors in this industry are looked down upon. Tony DeNigris, owner of Nationwide Cable TV Services, explains why. "The attitude of a lot of contractors is, 'let's just get the thing built and up there and goodbye.'" But DeNigris sees a problem with the attitude of system operators, too. "Most operators will say, 'here's what I want you to bid on,' and the construction company will bid on it." DeNigris sees a need in the future for contractors to go in and make various systems evaluations and tests and advise system operators on financial questions. "I'm attempting to build my organization to the point where we can evaluate systems in the future."

Most contractors are limited in their ability to offer counseling especially about cost/effectiveness. "I came out of engineering and I end up getting into these things because of my background," DeNigris explains. "I deal well with the people I work with. I'm always on the inside talking about budgeting but it's not a standard procedure that contractors get involved."

Make Ready

A significant cost factor that has implications for the question of rebuilding is the make-ready fee. Usually one of the utilities will do a make-ready survey of all the poles in question and assess the cost of moving their equipment, such as power lines, transformers, secondary lines, telephone lines, and street or traffic lights. Often, regulations will require a new pole to replace a short one, and the utilities will charge top dollar.

DeNigris knows of a system in a suburb of New York City that had make-ready budgeted at $8,000 per mile, two years ago. "That system's make-ready was more than the construction and the electronics per mile," DeNigris says. One pole alone cost $1,200.

Complete rebuilding of older systems, that is to say reaching for a dramatic increase in technical capability of an existing system by redesigning and constructing a new system over the old one, can be a radical step that involves a major capital investment. The investment may be worth it in terms of increased revenue over time. But how long before another rebuild will be necessitated by maintenance problems or just obsolescence due to further advancement of the technology? On the other hand, it may cost an operator more in the long run to patch up and maintain a deteriorating system or only upgrade a system and continue to have limited channel capacity, if you count in the proportionally limited return on investment and the costs of rebuilding in the future. "When it's all over," Ted Hartson laments, "I think we're going to wind up, as an industry, spending an awful lot of money and getting very little benefit for it."

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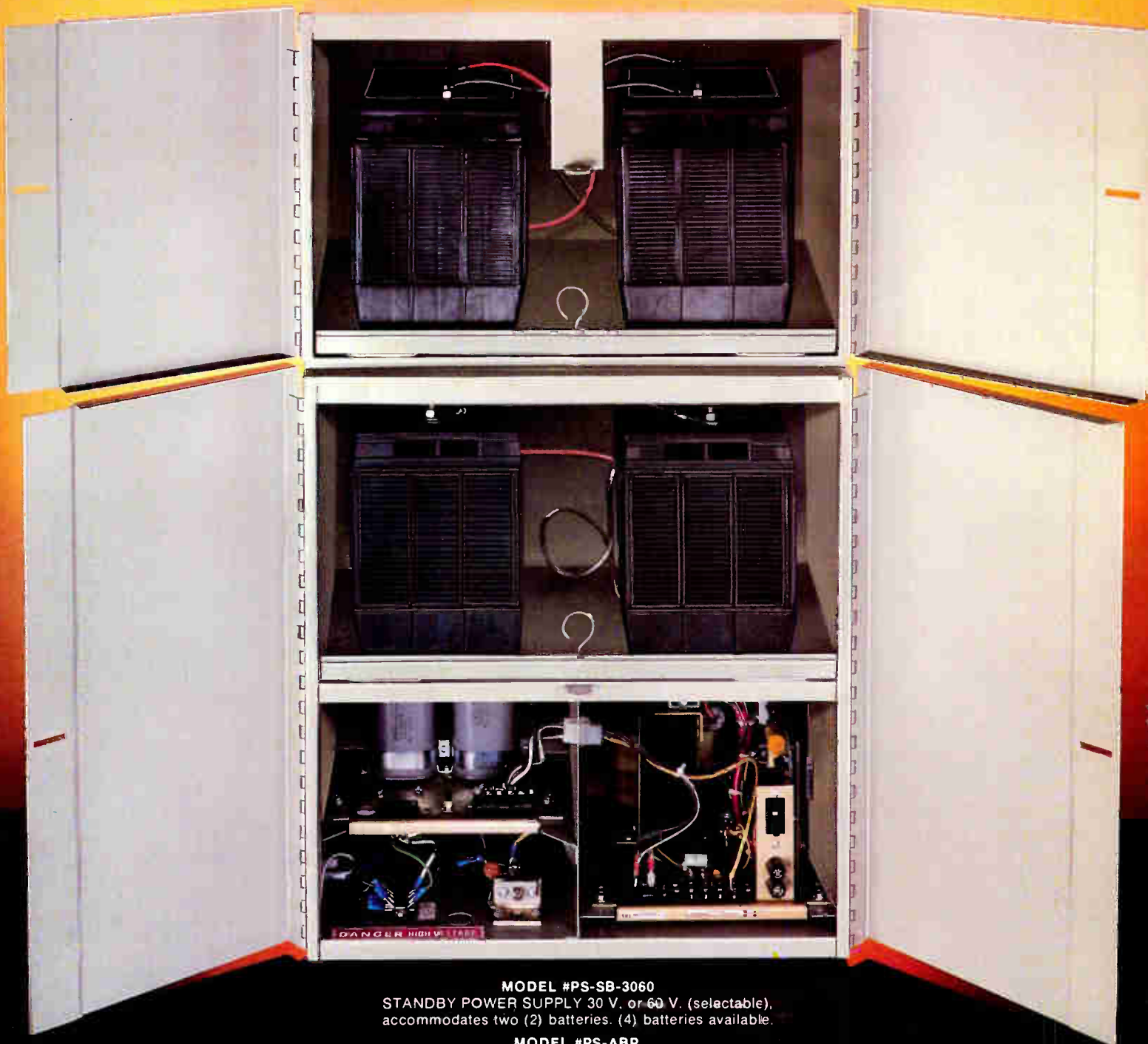

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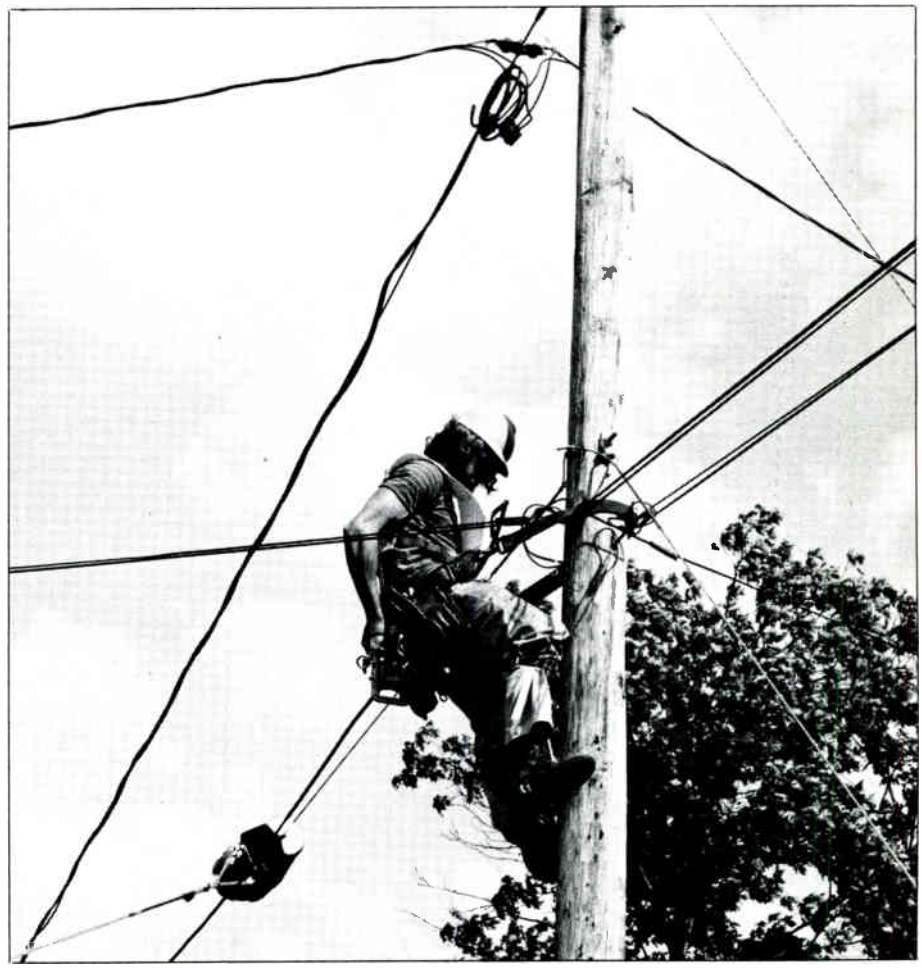
Plant Construction: Doing It Right This Time

By Anthony DeNigris, president, Nationwide CATV Services, Inc.

A rebuild project engineer once said to me, "Just get it up in the air and we'll take care of the problems later." How many times has that phrase been uttered by system managers and project engineers who had deadlines and quotas approaching? Given the rapid turnover of career-minded executives and engineers on their way up the corporate ladder, that engineer knew he wouldn't be around in the future to deal with the problems created out of such haste. After all, the object was to get the miles on those poles and make a lot of people look good at the time. The future? Well, that's *another* time!

With technology advancing daily, the MSOs and independent system operators now know that future considerations cannot be sacrificed easily. The investment in plant materials, electronics and passives, as well as the hardware costs borne by the system operator, vastly overshadows the cost of construction. Hence, the emphasis today is, "Let's protect our investment. We must have quality plant."

Many problems, however, stand in the way of quality system construction. It starts as far back as the walk-out and strand mapping, and on the designer's board where the pressure to produce is often staggering. Deadlines and quotas



exist at this stage and it is not unusual to hear a design manager say, "I know you are working the design out to save money in equipment and still achieve the design specs, but the man upstairs wants the system done. Pull something together and don't worry about the cost." If this scenario is repeated too often, the whole industry could suffer. Systems are paying dearly for mistakes made in the initial planning and construction stages. How do we get what we want without repeating the mistakes? No company wants to rebuild every ten years or so.

Current Problems

The explosive growth of the cable industry has created a major problem in finding dedicated and experienced construction crews. Of course, the large scale operations will boast of the quality and full service they offer, and many smaller contractors will promise quality personnel. But the question remains, where will all those devoted and experienced cable workers come from? The answer: they simply do not exist in the numbers that are needed.

The inexperience of crews is often apparent. How many project engineers have ever seen an aerial crew checking the pulling tension on a run of cable with a traction dynamometer? Most crews don't even know what the device is. The traction dynamometer is a device which accurately measures in pounds, the difference between the force generated to pull a cable forward, against the inherent resistance the cable has to that forward force.

In most cases the reluctance to use such a device in the field has little consequence. The relative pulling tension is normally far below the manufacturer's specified maximum for any straight run of cable. Even with a 90° bend in the cable run, the pulling is fairly light most of the time.

The problem occurs when multiple 90° and 45° bends are required in a continuous run of cable. Many project engineers will not permit a splice to be made between amplifiers and the cable crew will labor fiercely to pull cable through multiple 90° and 45° bends in an effort to satisfy system design specifications. Most cable crews intuitively realize that the cable should be out at a specific point because the tension becomes too tight to work with. If the pulling force was measured with a traction dynamometer at this time, it would be known that the maximum was being approached and a danger exists.

If, for example, the cable is pulled in excess of the manufacturer's maximum, the electrical characteristics of the cable may change due to the effect of it being drawn smaller in size. Since the size of the

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shield and the spacing between the shield and the center conductor of the cable, as well as the area of the dielectric, determines the electrical characteristics of the cable, we must assume that there will be a definite change developing and that it may cause signal degradation at certain frequencies. The cable may look good, but looks will definitely be deceiving.

The principals and practices of system plant construction have not been standardized throughout the industry although there exists a great need for it. Bell System practices have been used extensively to achieve a construction specification book. But we must recognize that there is a big difference between "Ma Bell" and "Kid Cable."

Build Techniques

Meanwhile, the controversy over the best system build techniques lumbers on. Do we need mechanical loop forming devices or can we get away with the old wood boards? Do we go with output loops or center loops? Do we use single or double lash; is the lashing wire clamp to be placed at the inside or the outside of the cable spacer? What percent of sag should there be in the spans? Should we use heat shrink or not? The questions go on and on and all of them are very important determinants in construction bidding. Therefore, in the new build situation, the accepted strategy and the expectations that project engineers have for construction contractors must be thoroughly understood so that the system meets expectations when it's completed.

One large system of 3,000 plus miles (and still under construction) specified at the outset in its construction manual that, "There shall be no pulling of cable allowed with a vehicle." The project engineer, in searching for a suitable contractor asked, "Do you pull cable with a truck?" The contractor responded, "Do you want the system built?" Needless to say the manual was eventually revised.

If time and cost were not uppermost considerations, the best method of pulling cable would be to string a lead rope of approximately 400 or 500 feet through two spans and attach it to a portable winch, which pulls the rope and the cable in constant increments of three to five inches. Of course, if this had to be the way cable went up, then 1982's projected 66,500 aerial cable miles would take until 1992 to get on the poles. The cost of such a method would be equally prohibitive.

Underground cable installations have their own problems and controversies. The most overlooked problem is that of direct burial service, particularly in rocky terrain. On a recent walk through an underground serviced area with the manager of a system, we pointed out a spot and said, "Look at this cable. It's only two inches below the grass and the slot is not even closed in. Rocks are all over and around the cable." The manager simply didn't want to hear about it. His response was, "Look, I'm getting active customers out here and it's numbers I want." Hopefully the industry is not leaning toward this type of thinking.

There are situations where, although the cost may be the determining factor in how the underground cable is installed, there should be one way to get the job done right. A good example is cable burial in rocky terrain. The decision must be made between direct burial or trenching with either sand or conduit around the buried cable. Most of the time the direct burial method wins because of cost effectiveness. But in the long run, the cables will have to be replaced and usually at phenomenal prices, including expensive area restoration. You can't fool Mother Nature, and it's just a matter of time before she works her magic on the cable that was placed in the midst of all those rocks. With the ground constantly shifting, little by little, the rocks' abrasive action and other environmental forces will cut through the cable. So you locate it and place a splice there. But all is not well, for how many splices can cable tolerate before the system is down with signal problems?

Demand Quality

Compromise may be allowed but quality must be demanded. Proper training and adequate equipment permits the professional cable crew to be productive, conscientious and efficient. The budgetary requirements of many "new build" systems limits the quality they can hope to achieve since the contractor may tend to cut corners or bring in lesser experienced or sub-contracted crews in order to complete the job under a low rate situation. It all boils down to the old addage, "You get what you pay for." The system operator ultimately pays the price for such an initial strategy as a result of future repairs, reruns of cable sections, or complete rebuilds.

When the mistakes of the past begin to catch up, the new system manager has to take responsibility for the aerial cable falling apart throughout the system. So, the money comes forth and another contractor reaps the benefits when "the man upstairs" says, "Do it right this time."

Anthony DeNigris is the president of Nationwide CATV Services, Inc. Mr. DeNigris formerly served as chief engineer of Southern Connecticut Cablevision in Bridgeport, Connecticut and is a graduate of the Connecticut School of Electronics.

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To prepare for this airlift, RCA Cablevision Systems had fit special lifting pallettes to the headend equipment to meet the requirements of the rooftop staging area. This special preparation by RCA to facilitate on-site installation is not unusual.

To meet a completion schedule for the Philadelphia, PA, Police and Subway Surveillance System, RCA literally hand-delivered specially configured racks and rearranged room layouts for timely, economical installations. And, when another customer required rush headend delivery, the system was put on a rapid cycle build schedule and was flown to the location. RCA on-site crews have the authority to get the job done logistically.

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RCA Cablevision Systems is committed to 400 MHz and to supplying those operators employing the system. The Model 452 Amplifier, Model 450 line extender and 400 MHz passive devices are available from your RCA sales representative. To obtain a copy of a detailed treatise on 400 MHz, call (213) 891-7911.

TRUNK LINE

Q: *We are contemplating converting three UHF channels to channels 2, 4 and 6, then combining them simultaneously on our transportation system line with existing channels 3 and 5. What do you think of this convenient approach of transporting signals from the antenna site to the headend?*

A: It may be convenient, but it may also contribute to a mass exodus of subscribers.

In this instance, you are compounding the already existing problem of the equipment working with adjacent channels, even if the incoming signals from the tower site are AGC or level controlled. The UHF channels in your system are without level control.

By attempting this procedure, you may very well experience a 20 dB fade in one channel along with 20 dB increases in the equivalent adjacent channels. If this headend overmodulation occurs, you would require 80 dB performance in the headend box to get a 60 dB system. Also, there is no doubt that using this down-converting procedure will, at some time, result in adjacent channel leakage.

These problems would be visible by subscribers in the home as poor system performance and would probably result in numerous complaints.

Here's what RCA Cablevision Systems suggests: on transportation systems, do everything possible to ensure that the transported signals are non-adjacent channels. This will reduce the requirement for reprocessing equipment in the headend. This consideration is especially valid if the adjacent channels have non-controlled levels. An old adage at RCA that has undoubtably saved customers untold dollars is, "A little bit of planning can eliminate a lot of problems."

If you need help with the planning, contract RCA Cablevision Systems.

RCA's Trunk Line Column answers current questions by readers submitted to Cable Today. All questions sent to RCA become the property of RCA and the publication of the question and the corresponding answer is at the discretion of the Cable Today staff. Questions should be sent to: Cable Today, RCA Cablevision Systems, 8500 Balboa Blvd., Van Nuys, CA 91409.

New RCA 400 MHz Converter 58-Channel Digital Control

RCA Cablevision Systems has introduced the new push-button KS series of remote-tuning, set-top converters. The KS series 58-channel (400 MHz) converters utilize the latest digital technology, featuring a microprocessor design that incorporates frequency-synthesized tuning and AFC for automatic, precise channel tuning.

The converters are field-switchable for standard, HRC and IRC channel assignments, eliminating the need to stock three different configurations. The field-programmable, all-channel, in-band decoder option accepts up to 16 levels of pay programming for optimal flexibility in tiering of services. RCA's unique new design provides simple, highly secure authorization of desired channels. The units have been designed to add a future addressability option that will provide control of subscriber service from a central office. An electronic A/B switch option expands the converter capability to 116 channels for application in dual cable systems. The memory of the RCA KS converter is capable of storing 15 channels which can be randomly selected from either the A cable, B cable, or both.

The new KS series converter joins the RCA family of subscriber devices. The M series of set-top converters now includes a 58-channel model. This series is distinguished by its compact, elegant design. The M series converters are available for 300 MHz applications.

The RCA SCMC converters are available in cord remote or one-piece set-top versions. This product is cost-effective and provides reliable, simple operation.

For operators desiring to add premium channels to existing systems with converters, or who have 12-channel systems, RCA has its Encoder/Decoder system.

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- ☐ M Series Converters
- ☐ SCMC Converters
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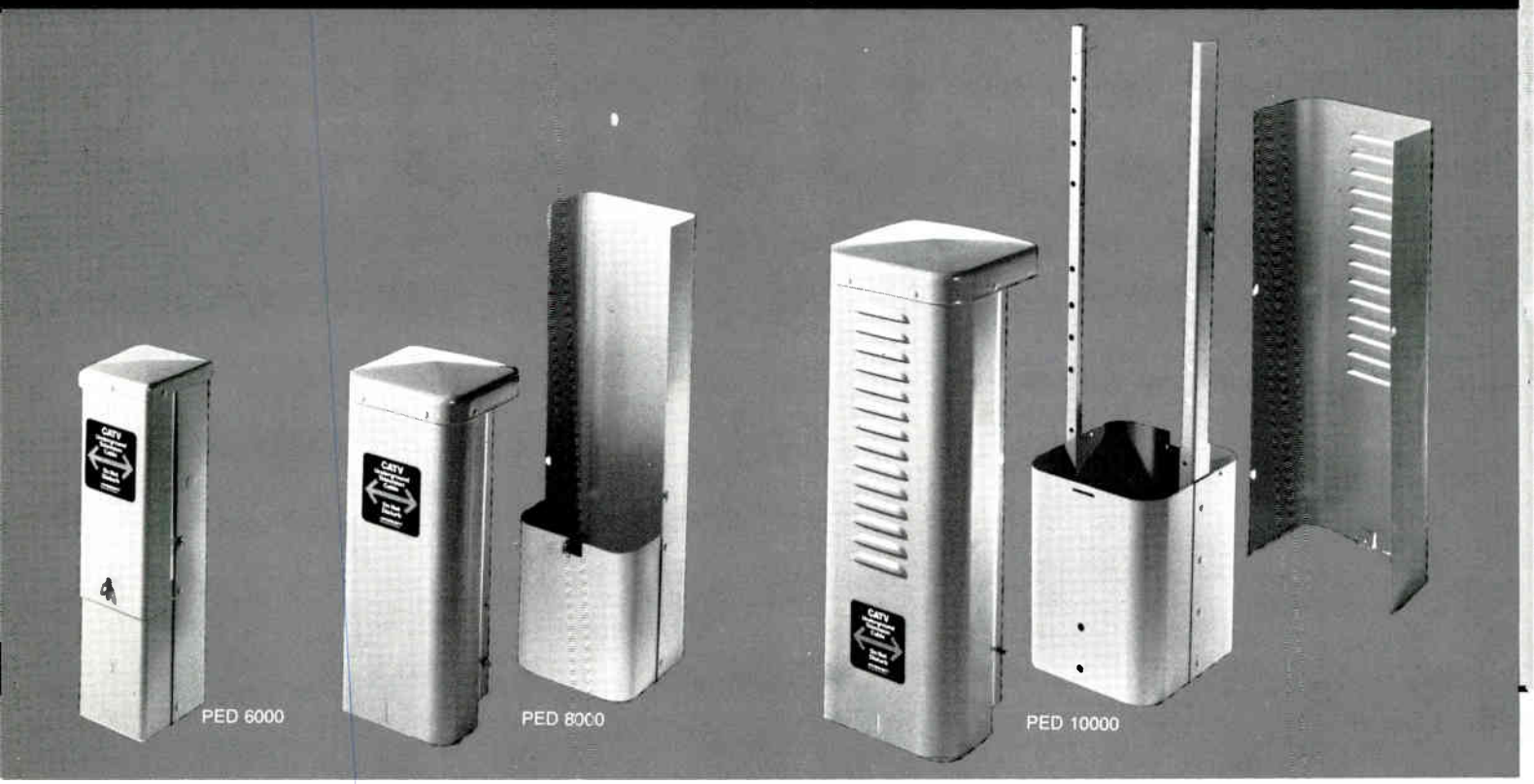

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The PED 10000's front and back covers are removable to aflow a full 360 degree access for easy mounting of larger active equipment. Both covers have large screened louvers to eliminate insect nests while reducing heat build-up.

Dimensions

PED 6000	5¾" wide, 5¾" deep, 20" high
PED 8000	8½" wide, 8½" deep, 26" high
PED 10000	10½" wide, 10½" deep, 38" high

Accessories

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42" heavy gauge anchor post
Mounting bracket for Jerrold FFT Multi-Tap (PED 6000)
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Applying Murphy's Law To CATV Engineering

by Ken Simons, consultant, Wavetek CATV Engineering Division

I. Some General Statements Of The Law:

I.1 Murphy's Law: If anything can go wrong, it will.

I.2 Law of Selective Gravitation: Anything accidentally dropped will fall so as to cause the greatest possible damage.

I.3 Law of Worst Consequences: Any failure affects the greatest number of subscribers, and occurs in the worst place at the worst time.

II. Management and System Planning:

II.1 All warranty and guarantee clauses become void upon payment of invoices.

II.2 Firmness of delivery dates is inversely proportional to the tightness of the installation schedule.

II.3 The equipment needed can't be gotten.

II.4 The equipment not needed yet will be shipped ahead of schedule, and there won't be anywhere to store it.

II.5 A cable run will be longer than is indicated on the "as built" strand map.

III. System Installation:

III.1 Cable will be pulled across intersections at rush hour.

III.2 The pole that absolutely must be climbed will be in the backyard with the biggest dog.

III.3 The amplifier station indicated on the design layout will be completely inaccessible.

III.4 The cable remaining on a reel will be slightly shorter than that required for the next run.

III.5 The more difficult it is to pull a section of cable, the more likely it is that it will either be too short or damaged.

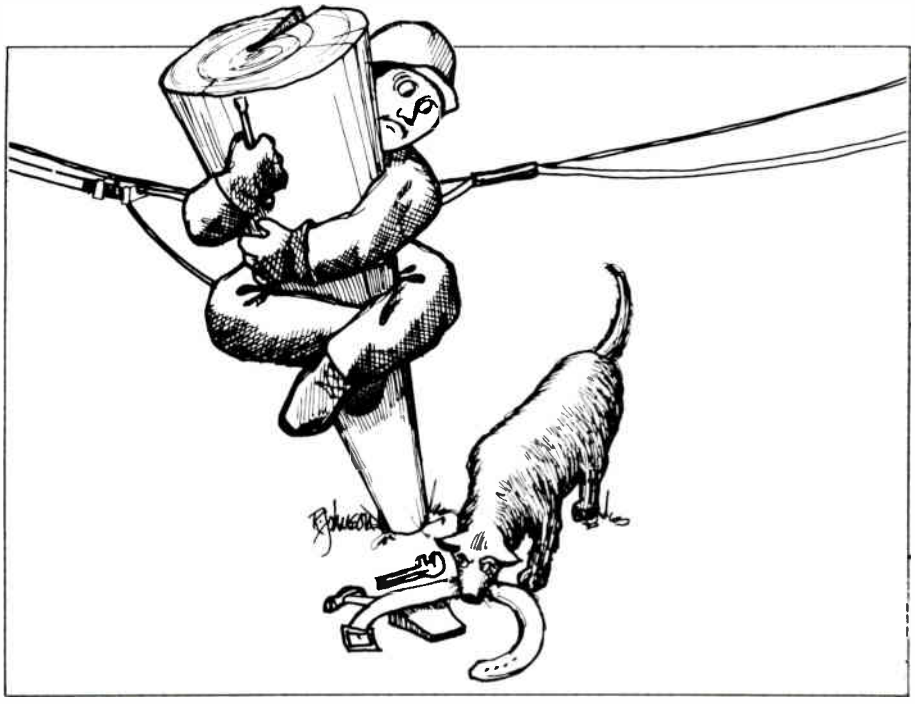
III.6 The Law of Selective Gravitation is the pole climbers worst enemy. Any tool dropped from a pole will land on the roof of a police car.

IV. Trouble Shooting:

IV.1 Pole-mounted equipment will not fail in good climbing weather Outages only occur when it is hot enough to fry eggs, raining cats and dogs, or colder than a well digger's toes.

IV.2 Intermittently failing equipment will not intermit when you're there to catch the trouble.

IV.3 System failures will occur late on Friday afternoon, or during the crucial



inning of a World Series playoff.
IV.4 If you move up the system, assuming no signal, the outage will turn out to be due to the loss of power feed from down the system.
IV.5 The instruction book that you really need will have been thrown out by the receiving department.

V. CATV Headends:

V.1 Site surveys will show distant signals at the highest levels in ten years.
V.2 Stacked antennas will produce less output than a single one. The higher the tower, the more likely this is.
V.3 Moving the antennas to a higher site or taller tower will decrease the signals. The probability that this will happen is proportional to the cost and difficulty of the move.
V.4 Dishes that have been precisely aimed won't be.
V.5 During initial installation, the cable from Channel 5's antenna will be connected to the converter input for Channel 17.
V.6 After an expensive computer study to select the right UHF to VHF conversions, beats will only show up on the most important channels.
V.7 The top antenna on the tower won't be secure. This will only show up in a high wind when the temperature is 10° below zero.

VI. Cables and Connectors:

VI.1 The trunk line connector that works loose will be the one at the most crucial point in the system.
VI.2 Cable cracks and loose fittings will occur at the system locations where the level is highest.
VI.3 A DC resistance check on a newly installed cable will show it is OK. Actually the outer conductor is broken and the strand is providing the DC return.
VI.4 The F fitting at the end of a drop cable will be installed with the center conductor cut flush, so it's too short to make contact.
VI.5 Insulated staples for fastening drop cable to walls aren't.
VI.6 Isolating capacitors designed to keep the terminals on hot chassis sets from being hot don't. For self-protection, flick the cable connector across the terminals before grabbing either one. Better still, check for voltage between them with a neon tester. (It will light up on a good set anyway, unless a half-watt 22K resistor is soldered across its test leads.)

VII. The You Probably Caused It Law:

This is one of the most important laws, but it is very hard to condense it to a simple statement. Anyone who has done exten-

sive trouble-shooting on electronic equipment or systems will recognize it instantly. If you have just been working on a piece of equipment or a system to correct a problem, and another suddenly shows up, you probably caused it!

VII.1 The first place to look for trouble is where you just finished working. (You dropped a loose screw into the works, or you closed the cabinet and pinched a lead. In any case, you are the most likely culprit. To find the trouble most quickly, go back in your mind step by step, reviewing what you did, and what trouble it may have caused.)

Some Further Comments On The Law Of Selective Gravitation: Too much cannot be said about the importance of this law. There are many simple things that can be done to avoid its effects. When you use a soldering gun or iron don't shake the excess solder off the tip. With the help of Murphy's Law that blob of solder will fly through the air and land wherever it can do the most harm! Save yourself later trouble and wipe the tip with a sponge or a rag.

When you are trimming the braid off the end of a drop cable keep it away from any equipment, including the customer's receiver. Those little strands of wire can do marvelous things to a circuit if they land in the wrong place. The same idea holds when you're drilling holes in metal. Watch where those chips go, and avoid Murphy's insidious law!

Finally, when you are taking any equipment apart, don't drop anything into it, or if you do, turn it upside down (if you can without causing further problems) and shake it until all these parts fall out. You'll be glad you did!

Ken Simons has had a long and illustrious career as an electrical engineer, beginning as a ham radio enthusiast in 1927. He designed test equipment in the early 1930's and obtained a BSEE from the Moore School of Electrical Engineering at the University of Pennsylvania in 1938, graduating cum laude. He entered the cable television industry in 1951 as the second professional engineer that Jerrold hired. He was with Jerrold for 25 years and was vice-president for R&D in the mid-1960's. Simons is currently a consultant to Wavetek's CATV Engineering Division. The author wishes to acknowledge that this article is based on one written by D.L. Klipstein in 1967 for EEE Magazine.

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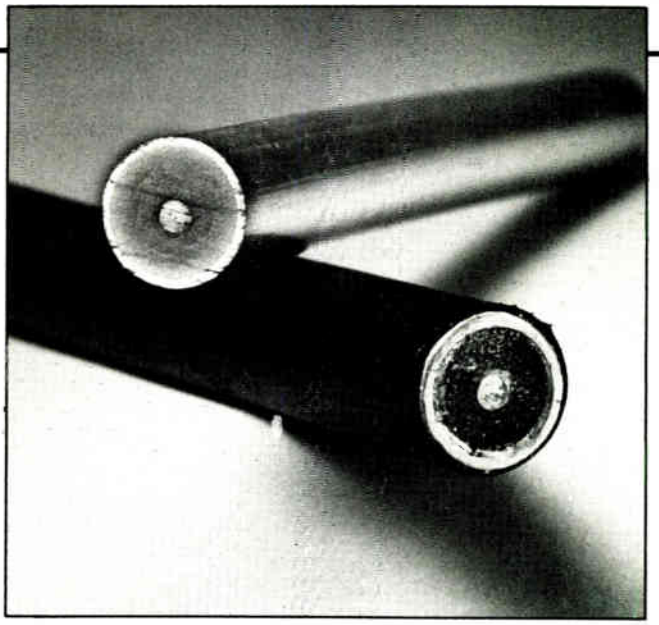

Coaxial Cable

In this month's **CED** Product Profile we are featuring models of coaxial cable used in feeder distribution in operating cable systems. Every .412", .500", and .625" coaxial cable of the types identified are listed. While there are eight manufacturers listed, there are 45 models featured.

The types of coaxial cable shown in the accompanying chart include both plain and/or jacketed versions but not the armored or messengered types. Many of those manufacturers listed offer other types and options and should be consulted for the specifications on types of cable not represented in this chart.

Two types of center conductors are listed, if available, solid copper and copper clad aluminum. If one or the other is not listed, consult the manufacturer as it may be offered as a special order option. In all cases except ReMee Products, the outer sheath is aluminum. The dielectric used, with the exception of General Cable, which employs a combination of air and thermoplastic fused discs, is the gas injected foam polyethelyne.

The maximum attenuation for each model listed will be indicated at 216 MHz and 300 MHz. If the attenuation at higher frequencies was made available, the higher frequency will also be identified in the chart.

The minimum bending radius expressed is the capacity of the cable to be bent 180 degrees around a mandrel of radius equal to the figure listed, times the diameter of the cable, without showing evidence of wrinkling, splitting, or cracking. The cable is bent around the mandrel of radius in the direction opposite to the normal curvature on the cable reel.

In future Product Profiles, drop cable as well as trunk cable and other equipment elements that are the constituent components of CATV hardware will be featured. Next months **CED** Product Profile will feature headend rack-mounted video modulators.

Model	Conductors	Dielectric	Maximum Attenuation	Capacitance	Velocity of Propagation	DC Resistance	Minimum Bending Radius	Maximum Pulling Tension
Capscan Cable Company, Adelphia, New Jersey								
CC-500 (.500" plain or jacketed)	copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.10dB/100 ft. 300MHz—1.32dB/100 ft. 500MHz—1.75dB/100 ft.	15 pF/ft.	88%	@ 20°C: inner conductor—1.75 ohm/1000 ft.	14 times cable O.D.	200 lbs./ft.
CCS Cable, Phoenix, Arizona								
43200 (.412" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.52dB/100 ft. 300MHz—1.81dB/100 ft.	16.8 pF/ft.	81%	@ 20°C: inner conductor—1.66 ohms/1000 ft.	16 times cable O.D.	150 lbs.
44200 (.412" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.52dB/100 ft. 300MHz—1.81dB/100 ft.	16.8 pF/ft.	81%	@ 20°C: inner conductor—2.60 ohms/1000 ft.	16 times cable O.D.	150 lbs.
45200 (.412" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.37dB/100 ft. 300MHz—1.63dB/100 ft. 400MHz—1.90dB/100 ft.	14.8 pF/ft.	90%	@ 20°C: inner conductor—1.23 ohms/1000 ft.	16 times cable O.D.	150 lbs.
46200 (.412" plain or jacketed)	copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.37dB/100 ft. 300MHz—1.63dB/100 ft. 400MHz—1.90dB/100 ft.	14.8 pF/ft.	90%	@ 20°C: inner conductor—1.91 ohms/1000 ft.	16 times cable O.D.	150 lbs.
53200 (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.24dB/100 ft. 300MHz—1.49dB/100 ft.	16.8 pF/ft.	81%	@ 20°C: inner conductor—1.06 ohms/1000 ft.	16 times cable O.D.	200 lbs.
54200 (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.24dB/100 ft. 300MHz—1.49dB/100 ft.	16.8 pF/ft.	81%	@ 20°C: inner conductor—1.65 ohms/1000 ft.	16 times cable O.D.	200 lbs.

Product Profile

Model	Conductors	Dielectric	Maximum Attenuation	Capacitance	Velocity of Propagation	DC Resistance	Minimum Bending Radius	Maximum Pulling Tension
55200 (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.11dB/100 ft. 300MHz—1.32dB/100 ft 400MHz—1.54dB/100 ft.	14.8 pF/ft.	90%	@ 20°C: inner conductor— 0.86 ohms/1000 ft.	16 times cable O.D.	200 lbs
56200 (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.11dB/100 ft 300MHz—1.32dB/100 ft 400MHz—1.54dB/100 ft	14.8 pF/ft.	90%	@ 20°C: inner conductor— 1.34 ohms/1000 ft	16 times cable D.D.	200 lbs.
66200 (625" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—0.91dB/100 ft 300MHz—1.08dB/100 ft 400MHz—1.26dB/100 ft	14.8 pF/ft	90%	@ 20°C: inner conductor— 0.81 ohms/1000 ft.	16 times cable O.D.	280 lbs.
Comm/Scope, Catawba, North Carolina								
P-1 75-412 (.412" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.52dB/100 ft. 300MHz—1.81dB/100 ft.	16.5 pF/ft.	82%	@ 20°C: inner conductor— 1.66 ohms/1000 ft.	10 times cable O.D.	150 lbs.
P-3 75-412 (.412" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.35dB/100 ft. 300MHz—1.63dB/100 ft.	15.3 pF/ft.	87%	@ 20°C: inner conductor— 1.25 ohms/1000 ft.	17 times cable O.D.	150 lbs.
P-1 75-500 (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.21dB/100 ft. 300MHz—1.49dB/100 ft.	16.5 pF/ft.	82%	@ 20°C: inner conductor— 1.06 ohms/1000 ft.	9 times cable D.D.	200 lbs.
P-3 75-500 (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.09dB/100 ft. 300MHz—1.31dB/100 ft.	15.3 pF/ft.	87%	@ 20°C: inner conductor— 0.83 ohms/1000 ft.	16 times cable O.D.	200 lbs.
P-1 75-412CA (.412" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.52dB/100 ft. 300MHz—1.81dB/100 ft.	16.5 pF/ft.	82%	@ 20°C: inner conductor— 2.58 ohms/1000 ft.	10 times cable O.D.	150 lbs.
P-3 75-412CA (.412" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.35dB/100 ft. 300MHz—1.63dB/100 ft.	15.3 pF/ft.	87%	@ 20°C: inner conductor— 1.93 ohms/1000 ft.	17 times cable O.D.	150 lbs.
P-1 75-500CA (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.21dB/100 ft. 300MHz—1.49dB/100 ft.	16.5 pF/ft.	82%	@ 20°C: inner conductor— 1.64 ohms/1000 ft.	9 times cable O.D.	200 lbs.
P-3 75-500CA (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—1.09dB/100 ft. 300MHz—1.31dB/100 ft.	15.3 pF/ft.	87%	@ 20°C: inner conductor— 1.28 ohms/1000 ft.	16 times cable O.D.	200 lbs.
P-3 75-625CA (.625" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 211MHz—0.92dB/100 ft. 300MHz—1.10dB/100 ft. 450MHz—1.35dB/100 ft.	15.3 pF/ft.	87%	@ 20°C: inner conductor— 0.84 ohms/1000 ft.	15 times cable O.D.	295 lbs.
Crescomm, Inc., Fairfield, New Jersey								
RG-335 (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.20dB/100 ft 300MHz—1.63dB/100 ft. 400MHz—1.90dB/100 ft	16.7 pF/ft	81%	@ 20°C: inner conductor— 1.04 ohms/1000 ft.	10 times cable D.D.	200 lbs.
General Cable Company, CATV Division, Woodbridge, New Jersey								
FD M-III 11.5mm (.450" plain or jacketed)	Solid copper, aluminum sheath	Air and thermo-plastic discs	@ 20°C: 211MHz—1.10dB/100 ft. 300MHz—1.32dB/100 ft. 450MHz—1.63dB/100 ft.	14.0 pF/ft.	95%	@ 20°C: inner conductor— 1.31 ohms/1000 ft.	15 times cable O.D.	250 lbs.
FD M-III 11.5mm (.450" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Air and thermo-plastic discs	@ 20°C: 211MHz—1.10dB/100 ft. 300MHz—1.32dB/100 ft. 450MHz—1.63dB/100 ft.	14.0 pF/ft.	95%	@ 20°C: inner conductor— 1.77 ohms/1000 ft.	15 times cable O.D.	250 lbs.
FD M-III 13.0mm (.520" plain or jacketed)	Solid copper, aluminum sheath	Air and thermo-plastic discs	@ 20°C: 211MHz—1.01dB/100 ft. 300MHz—1.20dB/100 ft. 450MHz—1.47dB/100 ft.	14.3 pF/ft.	95%	@ 20°C: inner conductor— 1.08 ohms/1000 ft.	16 times cable O.D.	300 lbs.
FD M-III 13.0mm (.520" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Air and thermo-plastic discs	@ 20°C: 211MHz—1.01dB/100 ft. 300MHz—1.20dB/100 ft. 450MHz—1.47dB/100 ft.	14.3 pF/ft.	95%	@ 20°C: inner conductor— 1.47 ohms/1000 ft.	16 times cable O.D.	300 lbs.
FD M-III 14.5mm (.580" plain or jacketed)	Solid copper, aluminum sheath	Air and thermo-plastic discs	@ 20°C: 211MHz—0.91dB/100 ft. 300MHz—1.09dB/100 ft. 450MHz—1.35dB/100 ft.	14.3 pF/ft.	95%	@ 20°C: inner conductor— 0.87 ohms/1000 ft.	15 times cable O.D.	400 lbs.
FD M-III 14.5mm (.580" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Air and thermo-plastic discs	@ 20°C: 211MHz—0.91dB/100 ft. 300MHz—1.09dB/100 ft. 450MHz—1.35dB/100 ft.	14.3 pF/ft.	95%	@ 20°C: inner conductor— 1.18 ohms/1000 ft.	15 times cable O.D.	400 lbs.

Product Profile

Model	Conductors	Dielectric	Maximum Attenuation	Capacitance	Velocity of Propagation	DC Resistance	Minimum Bending Radius	Maximum Pulling Tension
ReMee Products Corporation, Florida, New York								
RG/11u (.405" plain or jacketed)	Solid copper, copper braid	Foam polyethylene	@ 20°C: 200MHz—2.20dB/100 ft. 500MHz—3.70dB/100 ft.	17.3 pF/ft.	78%	@ 20°C: inner conductor— 2.52 ohms/1000 ft.	14 times cable O.D.	200 lbs.
RG/11u (.405" plain or jacketed)	Solid copper, aluminum foil and braid	Foam polyethylene	@ 20°C: 200MHz—2.10dB/100 ft. 500MHz—3.50dB/100 ft.	17.3 pF/ft.	78%	@ 20°C: inner conductor— 2.52 ohms/1000 ft.	14 times cable O.D.	200 lbs.
Scientific Atlanta, Inc., Phoenix, Arizona								
11-412 SLM (.412" jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.52dB/100 ft 300MHz—1.81dB/100 ft	16.8 pF/ft	81%	@ 20°C: inner conductor— 1.66 ohms/1000 ft	5 times cable O.D	45 lbs
12-412 SLM (.412" jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.52dB/100 ft 300MHz—1.81dB/100 ft	16.8 pF/ft	81%	@ 20°C inner conductor— 2.60 ohms/1000 ft	5 times cable O.D.	45 lbs
11-500 SLM (.500" jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.22dB/100 ft 300MHz—1.49dB/100 ft	16.8 pF/ft.	81%	@ 20°C: inner conductor— 1.06 ohms/1000 ft.	5 times cable O.D.	45 lbs
12-500 SLM (.500" jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.22dB/100 ft. 300MHz—1.49dB/100 ft.	16.8 pF/ft	81%	@ 20°C inner conductor— 1.66 ohms/1000 ft.	5 times cable O.D.	45 lbs.
21-412 GID (.412" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.52dB/100 ft. 300MHz—1.81dB/100 ft.	16.8 pF/ft.	81%	@ 20°C: inner conductor— 1.66 ohms/1000 ft	10 times cable O.D.	150 lbs.
22-412 GID (.412" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.52dB/100 ft 300MHz—1.81dB/100 ft	16.8 pF/ft.	81%	@ 20°C inner conductor— 2.60 ohms/1000 ft	10 times cable O.D.	150 lbs
21-500 GID (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.22dB/100 ft 300MHz—1.49dB/100 ft.	16.8 pF/ft.	81%	@ 20°C: inner conductor— 1.06 ohms/1000 ft	10 times cable O.D.	200 lbs.
22-500 GID (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.22dB/100 ft. 300MHz—1.49dB/100 ft.	16.8 pF/ft.	81%	@ 20°C inner conductor— 1.06 ohms/1000 ft.	10 times cable O.D.	200 lbs.
31-412 GID 3 (.412" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.37dB/100 ft. 300MHz—1.63dB/100 ft. 450MHz—2.05dB/100 ft.	15.5 pF/ft.	87%	@ 20°C inner conductor— 1.28 ohms/1000 ft	16 times cable O.D.	150 lbs.
32-412 GID 3 (.412" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—1.37dB/100 ft. 300MHz—1.63dB/100 ft. 450MHz—2.05dB/100 ft.	15.5 pF/ft.	87%	@ 20°C: inner conductor— 2.01 ohms/1000 ft	16 times cable O.D.	150 lbs.
31-500 GID 3 (.500" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.10dB/100 ft 300MHz—1.32dB/100 ft. 450MHz—1.65dB/100 ft.	15.5 pF/ft.	87%	@ 20°C: inner conductor— 0.86 ohms/1000 ft	16 times cable O.D.	200 lbs.
32-500 GID 3 (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.10dB/100 ft. 300MHz—1.32dB/100 ft. 450MHz—1.65dB/100 ft.	15.5 pF/ft.	87%	@ 20°C inner conductor— 1.34 ohms/1000 ft	16 times cable O.D.	200 lbs.
31-625 GID 3 (.625" plain or jacketed)	Solid copper, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—0.90dB/100 ft. 300MHz—1.08dB/100 ft. 450MHz—1.36dB/100 ft.	15.5 pF/ft	87%	@ 20°C inner conductor— 0.55 ohms/1000 ft.	16 times cable O.D.	300 lbs
32-625 GID 3 (.625" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C 216MHz—0.90dB/100 ft. 300MHz—1.08dB/100 ft 450MHz—1.36dB/100 ft	15.5 pF/ft.	87%	@ 20°C: inner conductor— 0.87 ohms/1000 ft.	16 times cable O.D.	300 lbs.
Times Fiber Communications, Inc., CATV Div., Wallingford, Connecticut								
T 4412 (.412" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.35dB/100 ft. 300MHz—1.63dB/100 ft. 500MHz—2.17dB/100 ft.	15.3 pF/ft.	88%	@ 20°C: inner conductor— 2.48 ohms/1000 ft.	14 times cable O.D.	150 lbs.
T 4500 (.500" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—1.10dB/100 ft. 300MHz—1.32dB/100 ft. 500MHz—1.75dB/100 ft.	15 pF/ft.	88%	@ 20°C: inner conductor— 1.75 ohms/1000 ft.	14 times cable O.D.	200 lbs.
T 4625 (.625" plain or jacketed)	Copper-clad aluminum, aluminum sheath	Foam polyethylene	@ 20°C: 216MHz—0.90dB/100 ft. 300MHz—1.08dB/100 ft. 500MHz—1.44dB/100 ft.	15 pF/ft.	88%	@ 20°C: inner conductor— 1.12 ohms/1000 ft.	14 times cable O.D.	280 lbs.

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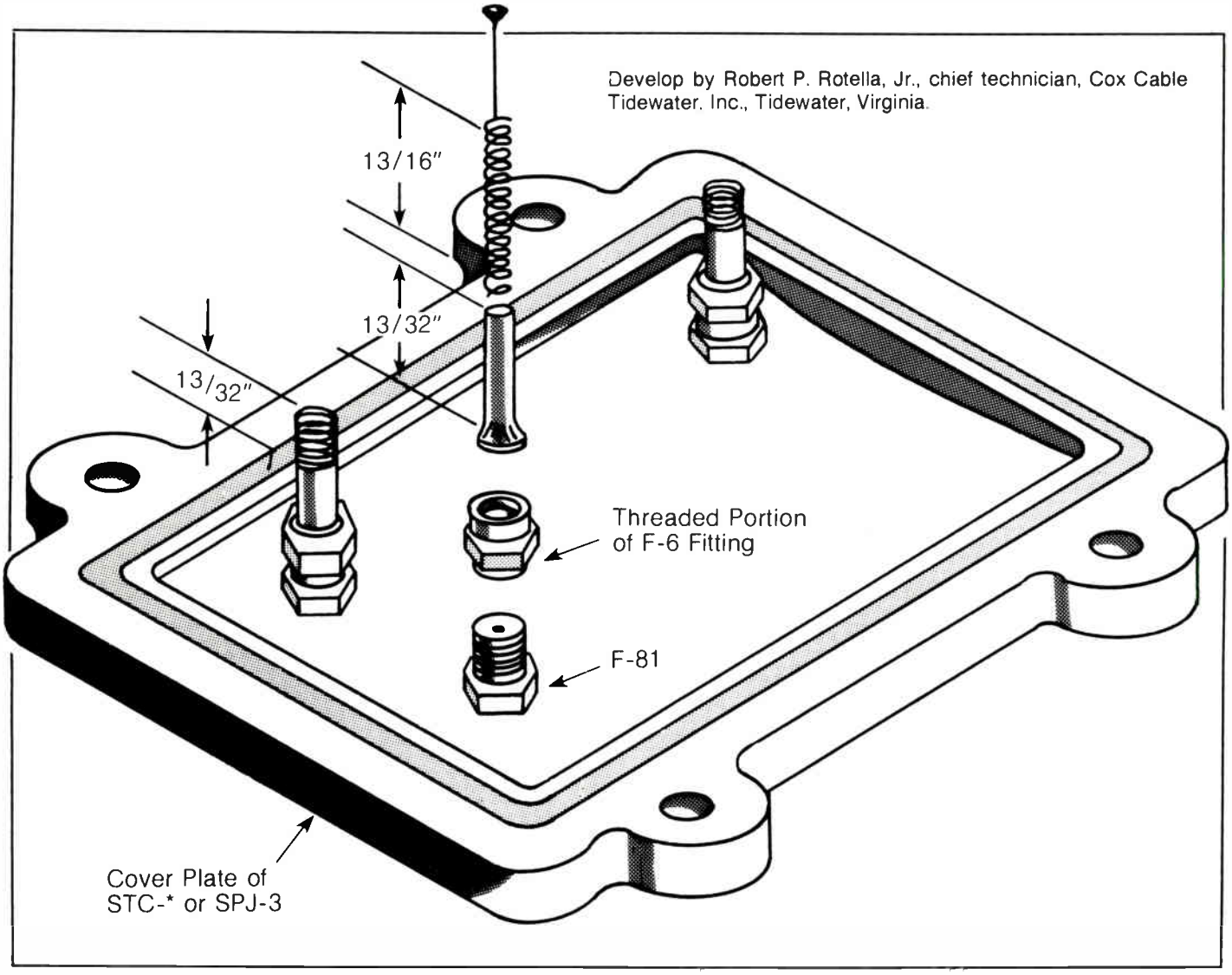
Tech to Tech

Every month *CED* will present an award for new ideas, helpful hints, or solutions to common technical problems in operating CATV systems. Ideas selected for publication will win $25 for the engineer or technician who developed it. Submissions should be sent to Editor, *CED* magazine, Titsch Publishing Inc., 488 Madison Avenue, Fifth Floor, New York, NY 10022.

A Test Plate For Jerrold Splitters, Directional Couplers, And Power Combiners



A Test Plate For Jerrold Splitters, Directional Couplers, And Power Combiners.

IT'S TIME YOU SWITCHED TO di-tech's PACE 1000 COMPUTERIZED *REAL-TIME WEEKLY EVENT CONTROLLER!*

It's the ultimate sophistication that anyone can use and everyone can afford! Automatically execute up to 935 or more switching events every seven-day period.

The expandable **di-tech Pace 1000** is a real-time computer event controller that automatically executes up to 935 events in a 7 day period. It employs solid-state memory: 30k is in EPROM and 34k is in RAM. The video terminal and keyboard are designed for simple English communication with the computer.

The Pace 1000 features these 7 particular function modes:

1. HELP mode displays a list of the modes and their mode keys and a list of commands.
2. REALTIME EVENT MONITOR mode displays the most current events (those that were most recently executed and those that are about to be executed), and any current display messages.
3. EDIT mode permits you to create, select and edit, or select and delete events in the database. You can also select and immediately execute an event in the database. The repeat day feature is also performed in this mode.
4. HOLD mode permits you to select and release a HOLD event, either with or without execution.
5. MANUAL OPERATION mode permits you to enter a special list of events for manual execution and to execute those events.
6. SET mode permits you to set the Auto Control on orr off, set the Message Display on or off, re-sequence the event item numbers for the entire database or set the system clock or the calendar date.
7. DEFINE mode permits you to define or delete names of sources, destinations, units or functions or to define or delete Display Messages.

With the proper interface you can also control audio and/or video switchers, IF processors, *any* on-off function, even your light switches!

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48 JEFRYN BOULEVARD
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Tel. #(516) 667-6300

Basic Concept: An interchangeable test plate for splitters, directional couplers, and power combiners that allows for testing pole-line passives without removing and resplicing the device.

Requirement

The question was, "How can you check pole line Jerrold splitters with a minimum of de/re-splicing?" One solution, though not very accurate, was to use a field strength meter and touch the center conductor of the test lead to the seizure screw. This approach was not only electrically unsound, but physically very tricky. The design of Jerrold FFT taps lead to an insight as to what method was necessary to assure accuracy, consistency and ease of application.

What was needed was an interchangeable plate with which one could substitute the original splitter plate and perform the necessary tests.

What was needed was an interchangeable plate with which one could substitute the original splitter plate and perform the necessary tests. The method had to conform to standard testing apparatus. The design had to be sound in terms of a

0-300 MHz sweep in keeping with the majority of the industry's technology.

Physical Design

Taps with interchangeable face plates are reliable in terms of connection, mechanical strength and electrical design. Take an old SPJ power combiner apart, and remove the seizure screws completely from the board. Then using a very small drill bit (⅛"), drill from the electronic plate down through the cast aluminum case, making the holes directly in line with the seizure threads. Having completed this, attach the cover plate back onto the case and mark on the inside of the cover through the holes previously drilled in the case.

Having the marks in the appropriate location, drill holes in the plate centered on the marks using a 13/32" drill bit. These holes are for the outside connection points. Insert three F-81 splices through the holes and fasten them down with a lock washer and nut fastened from the inside of the plate.

Constructing The Contact

Having the inside/outside connector in place, now construct the contact of the seizure screw to the center of the F-81 splice. Using the following parts, construct the contact:

F-6 fitting
Small spring (typically a ball-point pen spring)
Small copper wire, 18 gauge, stranded
Small plastic tubing
Heat shrink tubing

Using the threaded section of the F-6 fitting, melt the plastic tubing so as to flair out one end and fit it inside the fitting with a 13/32" section of the plactic tube sticking out of the fitting. Slide the small spring into the pipe, cutting off the excess spring to leave 13/32" of spring exposed. Then solder the piece of wire to the top of the spring and bring it down to make contact with the F-81 splice. Finally, cover the entire plastic tube with heat shrink tubing for added physical strength.

Results

Even though the contact brings about a double termination, the sweep is fairly good being ±1.25 dB. As far as absolute levels are concerned, the signal at each port is down by 5 dBmV, again due to double termination.

If this unit is checked against standard field procedures, technicians will find that it is a time saver and very effective. Not only can splitters and directional couplers be checked for malfunctions, but also the time and energy saved by not having to climb as many poles will in itself pay for the cost of the plate many times over.

Robert P. Rotella, Jr., joined Cox Cable South Carolina two years ago after completing an associate degree at Tidewater Community College. Currently at Cox Cable Tidewater, Virginia, he holds the position of chief technician. As CED's *first recipient of the* Tech-to-Tech *award, Mr. Rotella will receive $25.*

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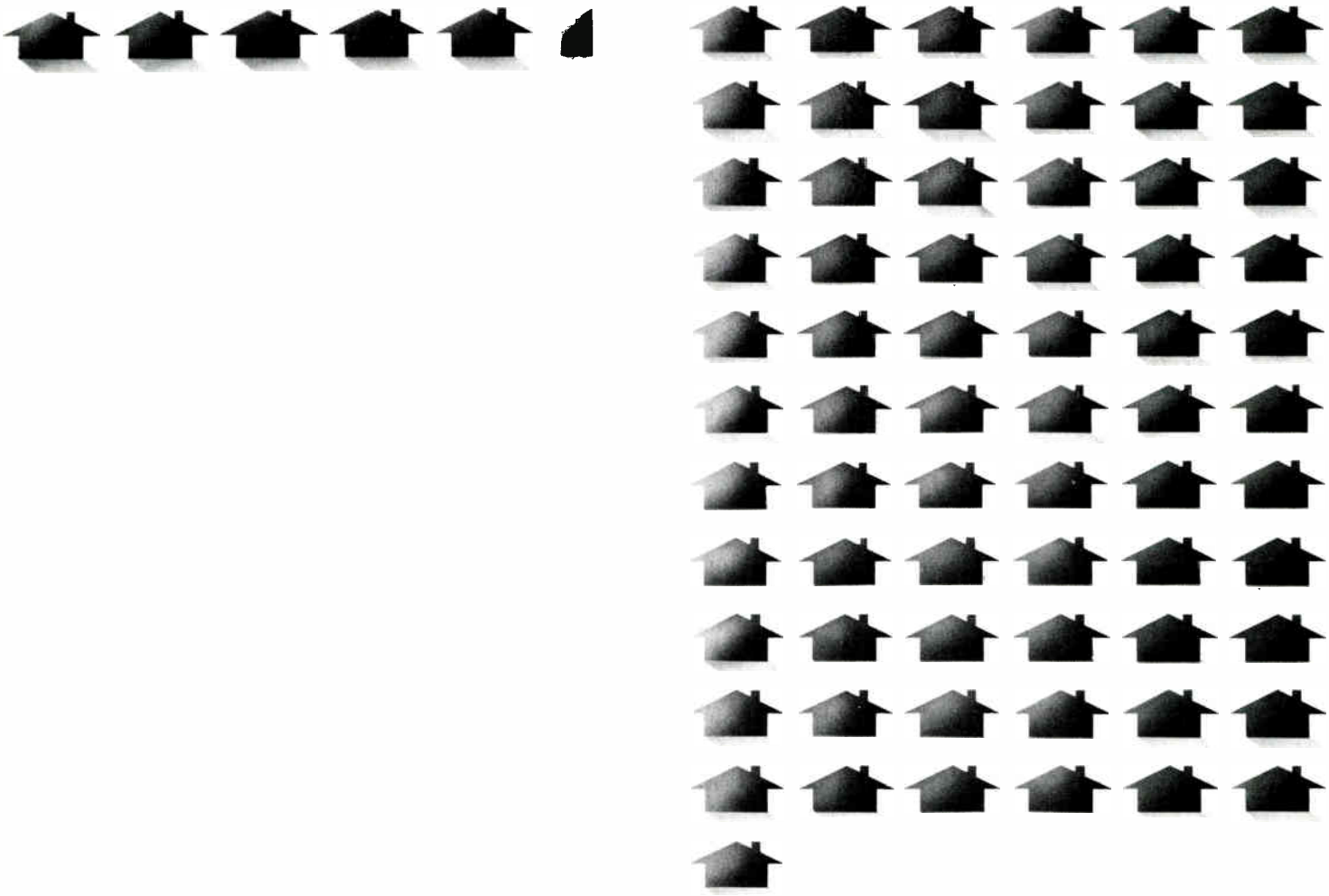
Homes passed per day.



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In a recently completed project for Cablevision Systems of Woodbury, Inc., GTC's 60-man crew buried 80 miles of cable and passed 5,000 homes in 75 work days. Each day's work included cutting the trench, laying cable, filling and sealing; digging, installing, and wiring vaults; and final clean-up of the entire area, with resodding at the vaults. The installation came in well ahead of schedule, and the job was so quick and clean that some residents didn't even know we'd been there.

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International News

New Semiconductor Technology Transferred To Canadian Industry

OTTAWA, ONTARIO—Funding of $793,000 has been made available to Linear Technology Inc. of Burlington, Ontario, for the transfer of semiconductor technology to private industry. The semiconductor technology was developed by research scientists from the University of Toronto working under a Department of Communications university research contract.

The technology transfer is expected to produce a device which will replace components now used in UHF (ultra high frequency) telecommunications equipment. The new device would cost less to produce than conventional devices, without sacrificing the high quality and reliability essential to UHF communications.

Linear Technology expects to have its new product line of high power, high frequency devices and fully integrated UHF amplifiers on the market within three years. The firm is known for its production and marketing of low-power integrated audio amplifiers, since it has captured a large portion of the world market.

TTI To Tour Japan's Laser Industry

NEW YORK—American and French scientists, engineers, managers, and R&D executives will have the chance to find out first-hand about Japan's advance in the flexible manufacturing system during a 16-day tour of that country's laser industry in June.

The opportunity is another in a continuing series of tours sponsored by Technology Transfer Institute (TTI), a Tokyo-based consulting firm dedicated to the exchange of technological information among scientists, engineers, and businessmen.

The American-French mission will be led by Fred Seaman, manager of the laser center at the ITT Research Institute in Chicago, regarded as a pioneer in the development of industrial applications of high-power lasers.

The use of lasers in micro-electronics and telecommunications will be discussed, but the focal point will be Japan's developments in the laser-integrated flexible manufacturing system.

"The laser is an unusually flexible tool and is destined to become a common element in manufacturing systems of the future," Seaman said. "The Japanese, already aware of this, reportedly have a multi-million dollar program underway to introduce the laser into flexible batch automation systems."

The tour will also include a study into Japan's developments in the use of the laser for cutting and drilling metals and non-metals, precision joining of components, heat treatment of steel and cast iron, alloying and cladding of metals, and quality control and inspection.

TTI began the exchange program in 1969, originally with the interests of Japan's own industrial growth in mind, offering tours of industrial countries to Japanese executives, but Japan's rapid industrial and technological development have allowed TTI to expand its exchange program to include tours of Japanese industry by foreign industrial leaders. Today, TTI has offices in New York, Los Angeles, London, Dusseldorf, and Singapore and has held more than 800 seminars, forums, and tours.

Gunnar Karlsen Orders SATCOM TVRO

SAN JOSE—Gunnar Karlsen, a Norwegian electronics firm, has become the first European company to order the SATCOM Inc., 12 GHz TVRO (Television Receive Only) satellite system, Dr. Bernard Jacobs, president of SATCOM, has announced.

Gunnar Karlsen purchased the SATCOM equipment for use with its own cable television systems and for DBS applications using a Ku-band transponder on the OTS-2 satellite.

The OTS-2 satellite is now being used by Britain's Satellite Television Ltd. (STL) and will transmit entertainment programming to Northern European countries, including Norway.

The SATCOM Ku-band receiver is a fully integrated system and includes a six-foot microwave antenna, down-converter, and indoor tuner.

Recently, SATCOM tested the TVRO's ability to receive a clear television signal in Canada on ANIK-B and in the United States on SBS-II. According to Jacobs, the sale of the 12 GHz receivers to Gunnar Karlsen represents a significant milestone in the development of small, low-cost TVROs.

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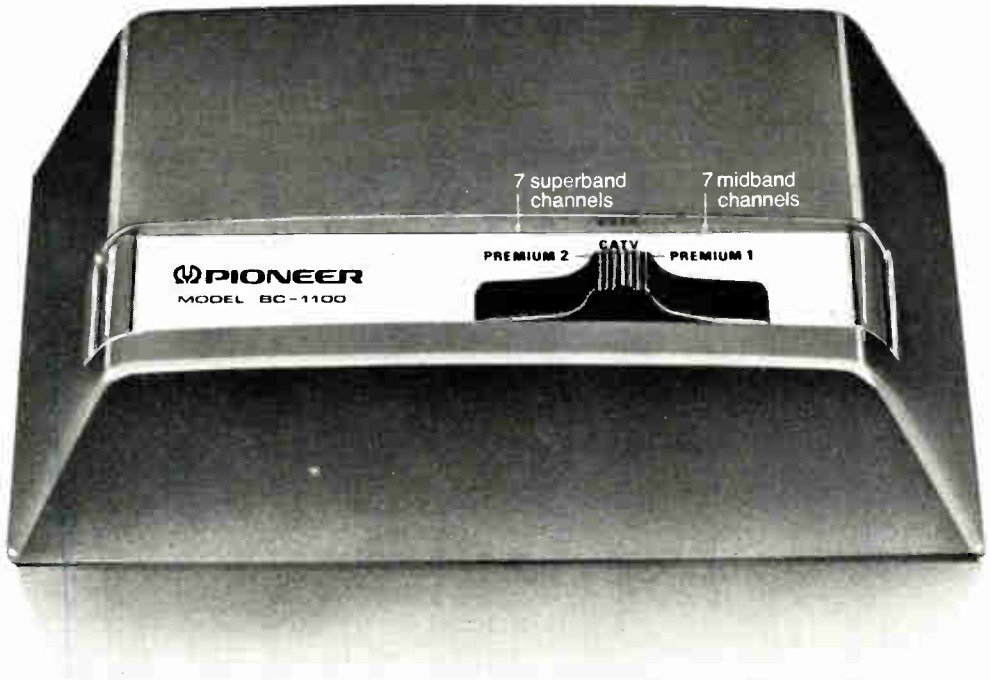

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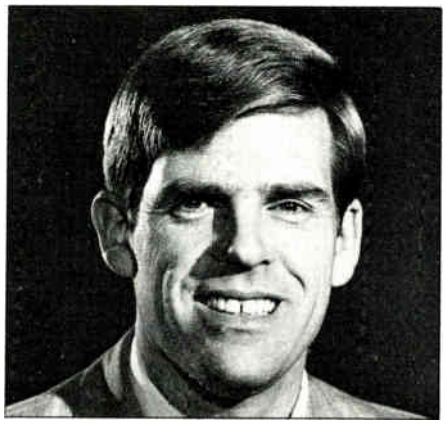
People News

★ **John C. Mallinson** of **Ampex Corporation's** Advanced Technology Division has been elected a fellow of the Institute of Electrical and Electronic Engineers. Mallinson, manager of the magnetic recording technology department, is one of only two Ampex employees to have received this honor from the IEEE. Joining Ampex in 1962, Mallinson has conducted research in magnetic recording theory, high density head fabrication, coding and communications theory, and the exploration of advanced concepts in various areas of recording. He also has been manager of high bit recording in the Data Systems Division. Mallinson holds several patents and has published more than 30 technical papers including two which have become standard references: "Maximum Signal-to-Noise Ratio of a Tape Recorder," and "Tutorial Review of Magnetic Recording." A graduate of University College, Oxford, England, Mallinson holds a master's degree in physics. He is a member of the American and British Institute of Physics and the IEEE Magnetics Society.

Dr. J. Peter Bingham

★ **Dr. J. Peter Bingham** has been appointed vice president of engineering of **Magnavox CATV Systems, Inc.** and will be responsible for both research and development and product engineering functions of the company. Dr. Bingham holds a B.S. in physics from Polytechnic Institute of Brooklyn, and an M.S. in experimental physics and a Ph.D. in electrical engineering from the University of Maryland. He holds multiple patents and has authored many IEEE-published articles. In addition, Dr. Bingham was the recipient of the prestigious Sarnoff Award and the Achievement Award from RCA consumer electronics division, where he most recently served as vice president of engineering.



David Large

★ **Gill Cable** has announced the appointment of two new vice presidents—**David Large**, vice president of engineering, and **Jack Yearwood**, vice president of the Bay Area Interconnect, a network of cable systems in the San Francisco area.

Mr. Large, who moves up from the chief engineer position, has been with the company since 1977. Before that, he was with Avantek where he designed a major portion of its CATV test instrumentation line.

Mr. Yearwood was Gill Cable's general manager of the interconnect division. He came to the cable system from KNTV, San Jose's ABC affiliate.

★ **Marshall Cohen** has been named vice president of research for the **Warner Amex Satellite Entertainment Company**. In his new position, Cohen will be responsible for overseeing the research systems for the programming and marketing of all WASEC channels, including Nickelodeon, The Movie Channel and MTV, as well as program development.

Previously, Cohen had been serving as vice president of programming for The Movie Channel. Before joining WASEC, he was vice president, Dresner, Morris and Tortorello Research, a public opinion/market research firm. Prior to that, he was a senior research analyst for Louis Harris and Associates.

Marshall Cohen holds a B.A. from Pennsylvania State University, an M.A. from the University of Florida and is currently a doctoral candidate at the same school.

★ **Warner Amex Cable Communications** has appointed **John Haynes** as director of programming for the company's Dallas QUBE Cable system.

Mr. Haynes comes to Warner Amex from Cable Atlanta in Atlanta, Georgia, where he also held the position of director of programming. He will oversee all programming and studio operations for the company's 80-channel two-way interactive facilities.

Mr. Haynes, who in addition to directing all Cable Atlanta programming in the metro Atlanta area, has also directed programming in Los Angeles, Calgary, Toronto and New York. He has more than ten years of cable programming experience, including work in local origination and community access programming.

Joseph Majczak

★ **NewChannels Corporation** has announced that **Joseph Majczak** has been promoted to vice president of engineering. Majczak is now responsible for engineering, new construction, purchasing and new product evaluation for the entire NewChannels operation.

Majczak joined NewChannels in 1967 as a technician for the Rome, New York, CATV system. While there, he was promoted first to field engineer and then to chief engineer for the system. In 1973, he was transferred to the corporate offices in Syracuse, New York, as part of his promotion to chief engineer for the entire NewChannels operation.

★ **Dr. Burton I. Edelson**, senior vice president of **Comsat General Corporation**, has been named **NASA** associate administrator for space science and applications. Edelson will be responsible for all of NASA's space science and applications programs, as well as the activities of the Jet Propulsion Laboratory at Pasadena, California, and the Goddard Space Flight Center, Greenbelt, Maryland. Edelson joined the Communications Satellite Corporation in 1967 as assistant director for Comsat Laboratories and in 1973 was named director of Comsat Laboratories.

In March 1979 he was elected vice president of Comsat, and he assumed his present position in September 1980. Prior to joining Comsat, he served as an engineering officer in the U.S. Navy with assignments on the staff of the National Aeronautics and Space Council at the White House and in the Office of Naval Research.

A graduate of the U.S. Naval Academy, Edelson earned his master's and doctorate degrees from Yale University.

John Reece

★ **John Reece** has accepted a position as senior engineer with **Zetron, Inc.** of Bellevue, Washington. Reece has assumed immediate responsibility for expanding the current product line to meet the emerging demand for digital coding formats such as POCSAG, GOLAY and NEC.

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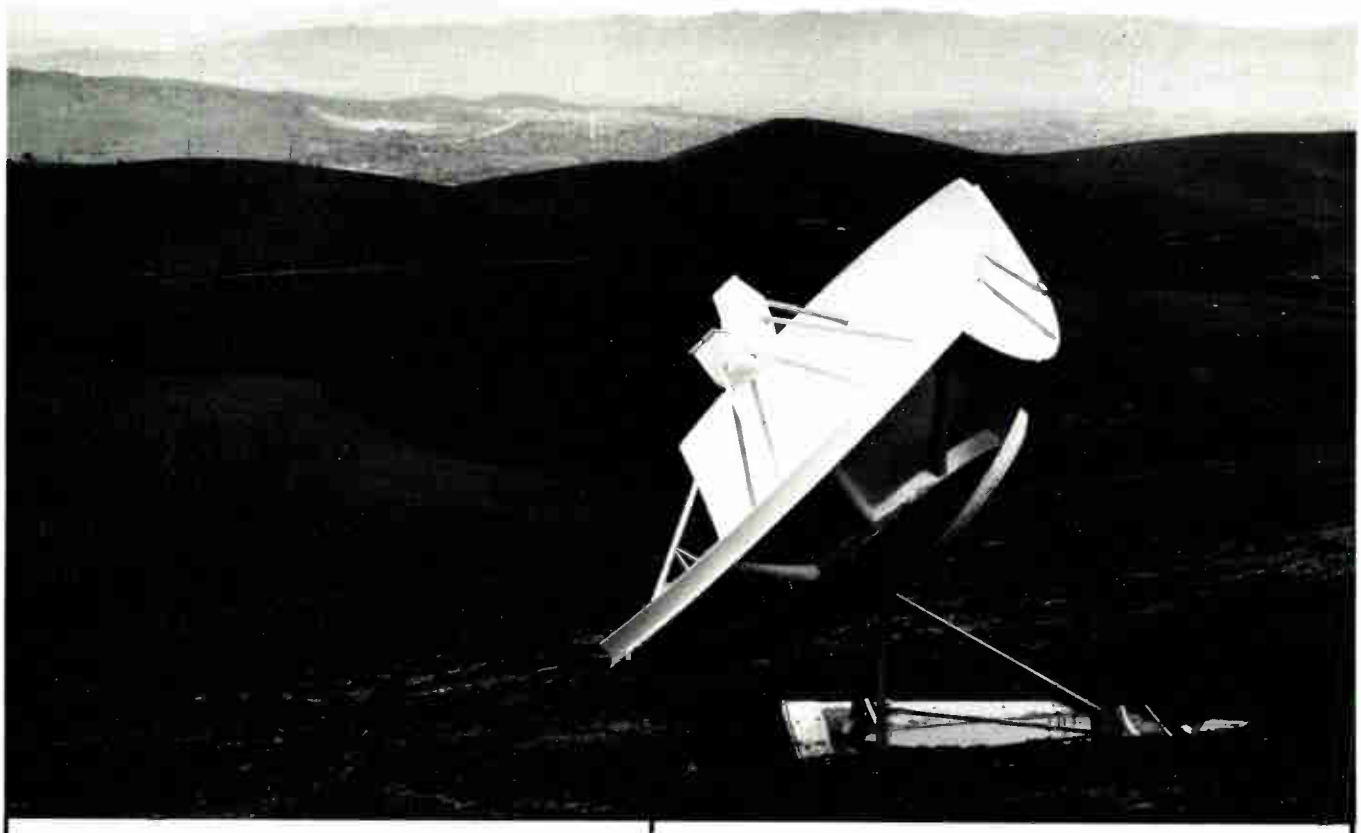

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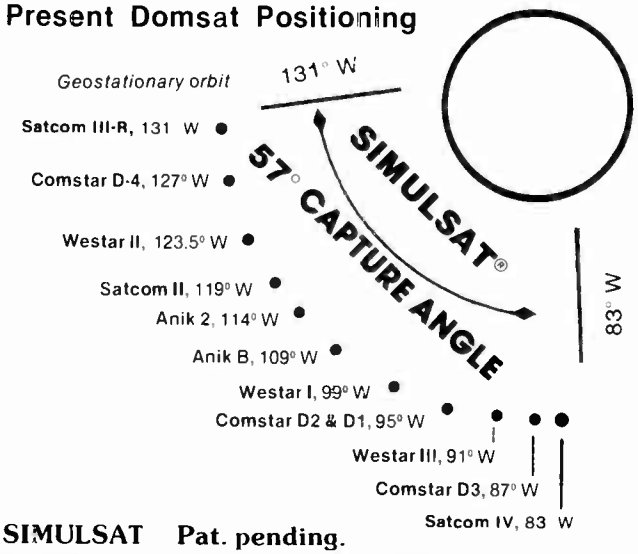

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Product News

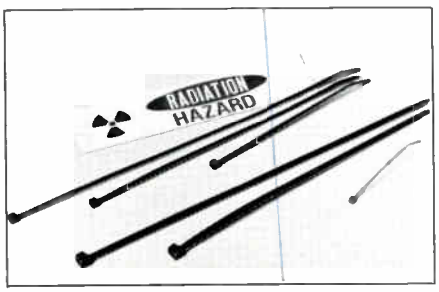
Cable Equipment

Microwave Coax Rotary Joints

Two new additions to a line of very short, low torque, high performance waveguide coax rotary joints have been introduced by **Microwave Development Laboratories, Inc.**

MDL Coax Rotary Joints now feature two new, very short, space saving versions: the 1.95" long, Model 120RC36 ("TNC" connector, DC to 12.4 GHz), and the 1.80" long, Model 180RCD36 (dual channel with better than 50 dB channel isolation, "SMA" connector, DC to 18 GHz, and DC to 4.0 GHz). Both incorporate MDL's low resistance, low noise contact for reliable operation and extended service life.

MDL Coax Rotary Joints literature is available on request. For more information contact: Ernest Bannister, Microwave Development Laboratories, Inc., 10 Michigan Drive, Natick, Massachusetts 01760; (617) 655-0060.



Pan-Ty Tefzel cable ties

New Pan-Ty Tefzel Cable Ties

Three new sizes have been added to the line of Pan-Ty cable ties made of Tefzel fluoropolymer by **Panduit Corp. Electrical Products Group**.

The ties are designed to fasten cables, hoses and wires in environments having radiation exposure, temperatures up to 302°F, or harsh chemicals. Typical applications include nuclear plants, chemical plants, spacecraft and aircraft, and various high temperature uses.

Six Pan-Ty Tefzel cable ties are now available for use on bundle diameters up to 4" and with minimum loop tensile strengths up to 120 lbs. The ties are offered in miniature, standard and heavy cross-sections and may be installed by hand or with Panduit® cable tie installation tools.

Tefzel provides radiation resistance up to 200 megarads and meets the requirements of IEEE 383. The continuous temperature range of Tefzel cable ties is -50°F (-46°C) to 302°F (150°C). The cable ties also provide resistance to ultraviolet light and weathering in outdoor use. They are not affected by most chemicals over a broad temperature range and are low outgassing under vacuum conditions.

For further information contact Manager, Inside Sales Dept., Panduit Corp., 17301 Ridgeland Avenue, Tinley Park, Illinois 60477—0981. Phone: (312) 532-1800.

Construction

Stahl Introduces Utili-Pak for Small, Mid-size Trucks

Stahl introduces the sleek new "Utili-Pak" designed for small and mid-size truck users concerned about flexibility. This new installer body features lift-up gullwings and lightweight construction. Constructed of high strength aluminum alloy, the Utili-Pak is lightweight, work ready, fuel efficient and resistant to rust. The gullwings lift up to provide 66 cubic feet of flexible storage space. Compartments are designed for easy access and organization, and may be equipped with various racks, bins or trays to meet specific applications.

The Stahl Utili-Pak is job-fitted for today's new domestic mid-size trucks—such as the S-10, S-15 and Ranger—yet, it also meets the needs of the small import trucks. It is backed by a three year warranty.

For more information write Stahl, 3201 West Lincoln Way, Wooster, Ohio 44691, or call 216/264-7441.

Steelweld Introduces Modular Cover for Compact Pickups

Steelweld Equipment Co. has introduced a compact, modular conversion cover that has been designed specifically to fit the new American-made compact pickup trucks such as the Chevrolet S-10, the GMC S-15 and the Ford Ranger.

The new cover combines the economy and durability of corrosion-resistant, all-steel construction with a weight-saving design that permits payloads in excess of 1,000 lbs. The covers are available for use with modular tubs or with a full compliment of shelving and drawers for materials and equipment storage.

Rear safety, step-bumpers, ladder racks and ladder support brackets as well as interior lighting are offered as optional equipment. For further information contact: Steelweld Equipment Co., P.O. Box 226, St. Clair, Missouri 63077 or P.O. Box 1123, Temple, Texas 76501.

A.B. Chance Company anchor installer

Portable Anchor Installer

A new portable anchor installer from anchoring manufacturer **A. B. Chance Company** drives screw-type anchors or foundations in areas where trucks can't go (easements, backlots, remote locations) or where truck-mounted equipment is unavailable. The two-man installer includes three compact modular components (gasoline-drive power-source, torque bar and drive head). They weigh only 319 pounds total, fit easily in station wagon or pickup, and lock together in five minutes at worksite. A handheld hydraulic head produces 1,100 foot-pounds of torque at 27 rmp, and an anti-kickback design transfers counter-torque to power cart with extendable stabilizer wheel.

For more information contact: A. B. Chance Company, 210 North Allen Street, Centralia, Missouri 65240.

Test Equipment

Gould Dual Trace Oscilloscope

The new portable OS300 20 MHz dual trace oscilloscope from **Gould Inc.**, instruments division, features greater value at a low cost, according to the company. Providing flexibility for a wide range of applications, this scope offers features typically found in more expensive scopes.

The two input channels of the OS300 are identical in performance, with an accuracy of ±3 percent. Sensitivity is continuously variable, with independent adjustment via calibrated controls, from 2 mV/cm to 25 V/cm. Input bandwidth extends from dc to 3 dB down at 20 MHz, permitting examination of fast transients or pulse rises. The 2 mV sensitivity allows this instrument to be used directly with

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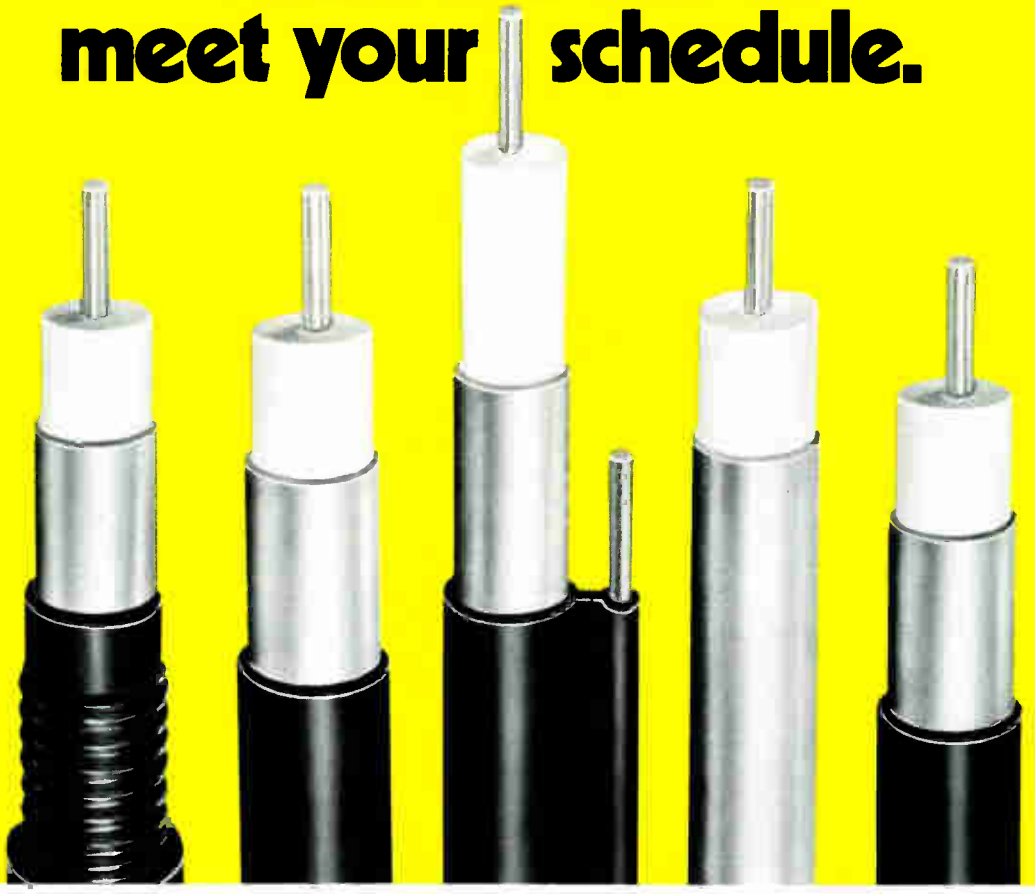
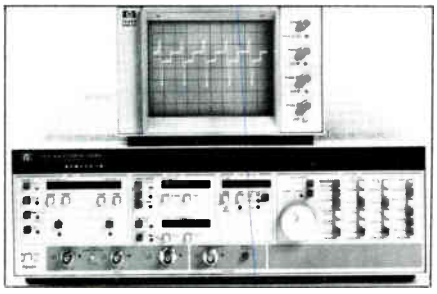


many transducers and low signal sources.

Although the OS300 features compact, lightweight construction for portability, it has a high intensity 8 x 10cm rectangular CRT with either an improved-efficiency standard phosphor or an optional long-persistence phosphor. A Z-modulation input is also provided for logic analysis, event markers or flyback suppression when observing X-Y traces.

The scope offers ease of operation with all controls on the instrument clearly labeled by function and logically arranged to facilitate fast, accurate setup and measurement.



Hewlett-Packard HP 5180A Waveform Recorder

Hewlett-Packard Introduces Waveform Recorder

Hewlett-Packard has introduced its first product into the field of waveform capture—the HP 5180A waveform recorder. The major technical contributions of the HP 5180A center on a 10-bit ADC with a 20 MHz sample rate. The company says this ADC delivers exceptional performance that is fully specified and characterized under dynamic operating conditions. The HP 5180A is able to reproduce rapidly changing signals accurately. For more information contact a local Hewlett-Packard sales office.

Earth Stations

Scientific-Atlanta Introduces Prime Focus Feed Option

Scientific-Atlanta, Inc., has announced the introduction of an optional prime focus feed on its 4.6- and 5-meter earth station antennas. With a prime focus feed antenna, rays are reflected directly to a feed at the antenna's true focal point. This antenna type exhibits lower sidelobes, yet provides the gain necessary for efficient reception of high-powered satellites.

The prime focus feed option provides cable-TV customers with a lower-cost alternative to cassegrain feed antennas. With the new, high-powered satellites, many users are finding that a lower-efficiency focal point feed antenna is a suitable, economical antenna for many earth station installations.

Miscellaneous

Omni Spectra Announces 950-1450 GHz TVRO Power Dividers

Omni Spectra, Inc., an M/A-COM Components Company, has announced the addition to its product line of a new series of 75 ohm TVRO power dividers featuring improved reception over conventional units. Reflected power and loss through the divider have been significantly reduced. In addition, these power dividers offer channel separation 50 percent better than competing types, further reducing cross-talk between channels. Configurations include 2-, 4-, and 8-way power dividers operating from 950 to 1450 MHz.

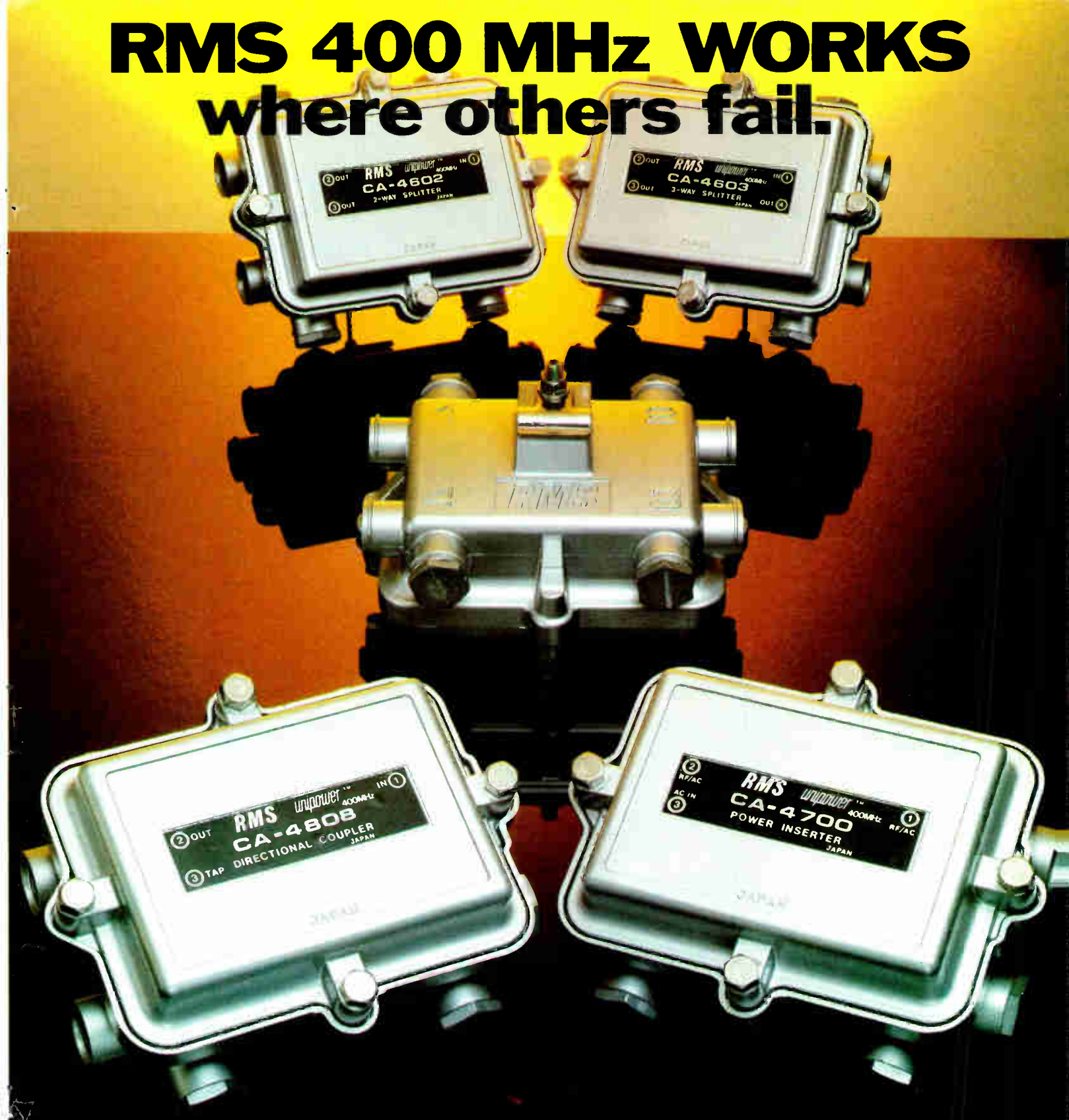
For additional information on the complete line of high performance power dividers, contact Omni Spectra, Inc., (603) 424-4111.

Plug-in Surge Suppressors

Kaiglo Electronics Company, Inc., a leader in electronics controls for industry, has developed a product especially designed to protect sensitive and expensive electronic video equipment from damaging power line transients, high voltage surges, and conducted electrical noise interference.

Designated the "Spike-Spiker™" they

RMS 400 MHz WORKS where others fail.



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are designed to clip transients and provide RF "Hash" filtering between the electronic video equipment and motorized equipment or other "noisey" devices in the vicinity to help prevent interference.

The Spike-Spikers are available in 3 models: the Deluxe Power Console which comes equipped with individually switched 120 VAC outlets divided in rows of separately filtered circuits, a main on/off switch, fuse and indicator light; the Quad-I and Quad-II units which are 4 socket plug-in wall mounted devices; and the Mini-I and Mini-II units which are 2 socket plug-in wall mounted units. All units are prewired and ready to use.

For more information write: Kalglo Electronics Co., Inc., Department: VID, 6584 Ruch Rd., East Allen Twp., Bethlehem, Pennsylvania 18017.

1982 EIA Publications Index Available

The **Electronic Industries Association** has announced the availability of a newly revised publications index, containing pricing and ordering information for more than 50 EIA documents.

The publications listed in this index contain information on market growth and industry trends, government activities in terms of federal and state legislation and regulations, as well as consumer education and career guidance.

The Electronic Industries Association is the full-service national trade organization representing the entire spectrum of companies involved in the manufacture or distribution of electronic components, parts, systems and equipment for communications, industrial, government and consumer-end uses.

The 1982 EIA Publications Index may be obtained at no charge, upon request, by contacting the EIA Public Affairs Office, 2001 Eye Street, N.W., Washington, D.C. 20006, 202/457-4980.

Amplica, Inc.

Amplica, Inc. has introduced two new models of its Amplivider™. The new versions, called the High Isolation (Hi-I) Amplivider, offer 60dB of receiver-to-receiver isolation. They stop in-band interference of single conversion receivers by reducing local oscillator leakage.

The new models have signal splitting options of single polarity 8 or dual polarity 8-way with zero loss. Like Amplica's Dual 8 Amplivider (16-way signal splitter — 8 for each polarization) the High Isolation Amplividers operate over 3.7—4.2 GHz with an LNA power supply of +20VDC @ 750 mA max. Also included are integral power inserters and external bias connection.

For further information, contact Amplica, Inc., 950 Lawrence Drive, Newbury Park, California 91320; 805/498-9671.

The photograph on page 50 of the January 1982 issue of **CED** shows an obsolete coring tool from **Ben Hughes Communications Products Company**. The photo above should have been included in **CED**'s Tech Review as part of Ben Hughes new product line. The **SCT** series is designed to strip and core all foam polyethene cables in one simple operation. With the tool steel blade as the only moving part and no adjustments required, there is virtually no maintenance except occasional lubrication of the blade.

For more information contact the Ben Hughes Company, (203) 388-3559.

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4700 North State Road #7, Suite 120, Fort Lauderdale, FL 33319

In Orbit

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
ARTS		9:00 p.m./12:00 a.m.		Satcom III-R,#1
ACSN	Weekdays: Weekends:	6:00 a.m./4:00 p.m. 6:00 a.m./1:00 p.m.	192°/#	Satcom III-R,#16
BET	Fridays: 11:00 p.m./2:00 a.m. except March 5 when the program will run from 1:30 a.m. to 4:30 a.m.		018°/#	Satcom III-R,#9
Bravo		8:00 p.m./6:00 a.m.		Comstar D-2, #3H
CableText		24 hrs.	None	Satcom III-R,#6 Vertical Blanking
CBN		24 hrs.	None	Satcom III-R,#8
CBS Cable		4:30 p.m./4:30 a.m.	524°/#	Westar III, #6
Christian Media Network	Mon.-Sat. 7:00 p.m.-2:00 a.m. Sunday 9:00 p.m.- 2:00 a.m.			Satcom III-R , #16
Cinemax		24 hrs.	None	Satcom III-R,#20 (E,C) Satcom III-R,#23 (M,P)
CNN		24 hrs.	None	Satcom III-R,#14
Cable News Network II		24 hrs.	None	Satcom III-R #15
C-SPAN	Weekdays: The program will not be seen on March 5. Sundays	10:00 a.m. to 6:00 p.m. Precedes USA Network, three to four hours	195°/#	Satcom III-R,#9
ESPN		24 hrs.	None	Satcom III-R,#7
Eros		Mon.-Sat. 12:00 p.m.-5:00 a.m.		Westar III, 7 12 (Fri., Sat.)
Escapade		8:00 p.m./6:00 a.m.		Comstar D-2,#4V
Eternal Word Television Network		7:00 p.m./11:00 p.m.		Westar III,#12
GalaVision	Weekdays: Weekends:	8:00 p.m./3:00 a.m. 24 hrs.		Satcom III-R,#18
HBO		24 hrs.	Program 729°/# Scramble 835°/# Duplication 940°/#	Satcom III-R ,#24 (E,C) Satcom III-R ,#22 (M,P)
HTN		8:00 p.m./2:00 a.m.	207°/#	Satcom III-R,#21 (P)

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
Lifestyle		24 hrs.	None	Satcom III-R,#3
The Movie Channel		24 hrs.	None	Satcom III-R,#5
Modern Satellite Network	Weekdays: Weekends:	noon/5:00 p.m. 8:00 a.m./1:00 p.m.	243°/#	Satcom III-R,#22
MTV: Music Television		24 hrs.	None	Satcom III-R,#11
National Christian Network		6:00 a.m./8:00 p.m.	073°/#	Comstar D-2,#4V
Nickelodeon		8:00 a.m./9:00 p.m.	311°/# (E,C,M) 519°/# (P)	Satcom III-R,#1
North American Newstime		24 hrs.	None	Satcom III-R,#6
PTL		24 hrs.	None	Satcom III-R,#2
Preview Channel	Weekdays:	10:00 a.m.-1:30 p.m.	207°/#	Satcom III-R, #21
Private Screenings	Fri.-Sat	12:00 a.m./3:00 a.m.		Westar III,#7
Reuters	Weekdays	4:00 a.m./7:00 p.m.	None	Satcom III-R ,#18
SIN		24 hrs.	None	Westar III, #8
SPN		24 hrs.	None	Westar III, #9
Showtime		24 hrs.	None	Satcom III-R ,#12 (E,C) Satcom III-R,#10 (M,P)
Trinity (KTBN)		24 hrs.	None	Comstar D-2, #9V
USA Network		24 hrs.	None	Satcom III-R ,#9
WFMT		24 hrs.	None	Satcom III-R,#3 Subcarrier
WGN		24 hrs.	None	Satcom III-R,#3
WOR		24 hrs.	None	Satcom III-R,#17
WTBS		24 hrs.	None	Satcom III-R,#6

Calliope: Weekdays: 6:00 p.m. to 7:00 p.m.; Saturdays: 8:30 a.m. to 11:30 a.m. The program will not be seen on Friday March 5.

The English Channel, Tuesdays: 11:30 p.m. to 1:30 a.m.; except March 9 when the program will run from 9:00 to 11:00 p.m. and March 23 when the program will run from 11:00 p.m. to 1:00 a.m. Sundays: 10:30 p.m. to 12:30 a.m.

E=eastern M=mountain
C=central P=pacific

Alert tones listed are for sign-on, sign-off.

All program times are listed for the eastern time zone, unless otherwise noted.

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